

FIGURE 12-1 ANALYSES OF TOTAL RARE EARTH ELEMENTS, ACME VS ALS

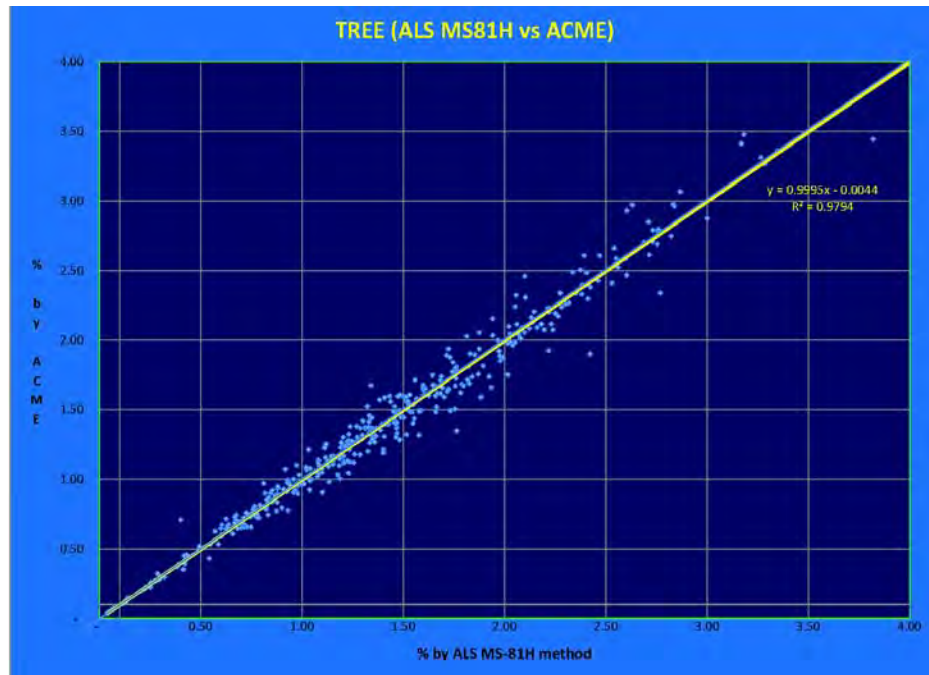


FIGURE 12-2 ANALYSES OF TOTAL HEAVY RARE EARTH ELEMENTS, ACME VS ALS

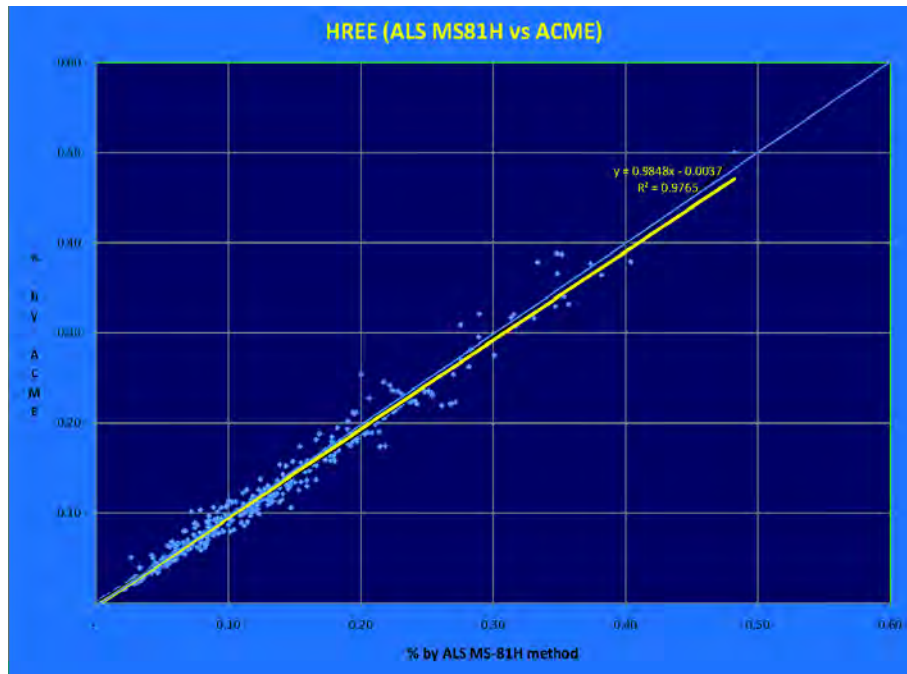


TABLE 12-4 COMPARISON OF NIOBIUM, TANTALUM AND ZIRCONIUM ANALYSES

Avalon Rare Metals Inc. – Thor Lake Project

Standard	Lab	Method	No.	Nb (%)	Ta (%)	Zr (%)
STD-L	ALS	MS81	188	100	99	101
STD-L	ALS	MS81H	19	101	100	101
STD-L	Acme	Method 4A	98	103	91	103
STD-L	ALS	XRF	43	104	73	106
Average (ppm)				1,383	144	9,750
STD-M	ALS	MS81	153	103	98	66
STD-M	ALS	MS81H	87	101	96	95
STD-M	Acme	Method 4A	121	109	90	106
STD-M	ALS	XRF	46	109	88	115
Average (ppm)				2,196	227	14,087
STD-H	ALS	MS81	112	100	100	66
STD-H	ALS	MS81H	99	98	96	111
STD-H	Acme	Method 4A	224	98	95	111
STD-H	ALS	XRF	21	98	98	120
Average (ppm)				2,676	301	17,234
STD-H2	ALS	MS81	285	96	36	29
STD-H2	ALS	MS81H	182	95	124	100
STD-H2	Acme	Method 4A	38	93	99	80
STD-H2	ALS	XRF	220	94	124	100
Average (ppm)				4,132	313	34,323

Note: Cases with analytical limits removed

The results indicate the following:

- For the low grade standard (STD-L), all methods (Acme and ALS) give similar results for Nb and Zr, but XRF appears to give anomalously low results for Ta. The cause of this is not known. Standard STD-M is similar.
- For higher grade Zr samples (>1%), MS81 does not give correct results due to analysis upper limits, however, for Nb and Ta (with the exception of standard H2/S-04-09) the results are satisfactory.
- Except for standard H2/S-04-09, Zr values are 6% to 20% higher with XRF than the average of all analyses from all labs.

In addition, XRF10 analyses generally show very low standard deviations.

It is concluded that zirconium analyses are systematically higher with XRF, and that these may in fact be more representative of the Zr content of the rock. On the other hand, the Nb and Ta analyses by ICP methods (ALS MS81H and Acme 4A/4B) are all sufficiently close that it is not necessary to conduct additional XRF analyses of these

elements. Given the important of Zr to the overall economics of the deposit, drill core should be routinely analyzed by XRF methods for Zr as otherwise the ZrO₂ grade may be systematically understated in resource estimates.

Avalon monitors the results of the Company's internal standards during routine analysis of drill core. Due to the large number of elements involved, being fifteen rare earth elements and three rare metals (Nb, Ta, Zr), it would be impractical to apply a normal logic table of failures where an analysis batch is failed on the basis of issues with one element. In addition, all core is analyzed and so about two-thirds of the samples that have chemical data are not significant in terms of the economics of the deposit. As a result, Avalon followed the following procedure for assessing analytical data:

- Batches were not failed if the samples analyzed were clearly far below any economic levels (not mineralized), unless the standards results were very grossly out.
- The results of the standards were reviewed to see how many elements were out of acceptable range as recommended in the standard certification, and if four elements were out of range (greater than three standard deviations), but two high and two low, and the remaining 14 elements were in range, the batch was accepted.
- If five elements or more elements were out of acceptable range (greater than three standard deviations), and all in the same direction, either biased all high or all low, then the batch was re-analyzed.

There were a few cases of blanks being out of acceptable range. However, on close examination of the results, these were almost invariably clearly associated with sample switching, and it was clear that a mineralized sample and the blank had been switched.

There was a noticeable reduction in the number of cases of standards being out of range in the case of ALS method MS81H compared to MS81.

The overall conclusions of the QA/QC work completed are as follows:

- Standard deviations of duplicate analyses on standards indicate that the precision of the laboratories is satisfactory, both for ALS Laboratory and Acme Laboratory.
- Duplicate analyses of standards and the duplicate reject analyses indicate that there is little systematic bias between ALS Laboratory and Acme Laboratory.
- ALS Laboratory and Acme Laboratory indicate means for the four standards utilized by Avalon within 5% of the accepted values for most rare earth elements,

Nb and Ta. Zr shows more deviation, with ALS MS81H and Acme Method 4A/4B being higher, as are the XRF analyses completed at ALS.

- Although there may be systematic differences between ALS and Acme for individual rare earths, in general, the TREE and HREE indicate that this difference is about 1% for TREE and 1.5% for HREE.
- Given the general agreement between laboratories on the mean of the standards, and the low standard deviation of duplicate analyses, Avalon considers that the standards are acceptable for QA/QC monitoring of the drill core analyses.
- In conclusion, the drill core analyses are considered sufficiently reliable for resource estimation purposes, with the caveat that analyses for Zr require further investigation to establish the cause of the difference between the various methods.
- However, Avalon does not consider that the variation in Zr analyses is material to the resource given the low proportion of the total value of Zr relative to all other metals (rare earths, Nb and Ta).

SPECIFIC GRAVITY MEASUREMENT

A detailed description of the routine used for specific gravity data collection is given in Section 11.

INDEPENDENT SAMPLING BY RPA

During the April 2011 site visit, RPA personnel collected eight core samples from six diamond drill holes from the 2010 drill program. Six of the samples were from the Basal Zone, and two from the Upper Zone. The core samples consisted of the second half core or quartered core retained by Avalon.

The samples were processed at SGS Toronto using the IMS95A and the IMS91B analytical packages. The presence of mineralization was confirmed and the assay results are similar to the original samples.

It is the opinion of RPA that Avalon follows the current industry practice, and that the analysis of standards, blanks, and duplicate reject samples show acceptable results.

13 MINERAL PROCESSING AND METALLURGICAL TESTING

METALLURGICAL TESTING

Numerous metallurgical tests have been conducted over the last two years to determine how best to recover the valuable elements from Thor Lake Basal Zone ore. The results of these tests and brief economic trade-off studies have led to the selection of a process including grinding, froth flotation, decomposition of the refractory rare earth, zirconium, and niobium-tantalum minerals and recovery of these elements from solution by solvent extraction and precipitation methods.

Metallurgical tests were undertaken on representative samples, both geographically and geologically, of the Upper and Basal Zones of the deposit, prepared in 2008, 2009 and 2010. The samples were developed from multiple drill holes, with composites comprising of numerous samples across the mineralized zones.

MINERALOGY

The mineralogy of the mineralized material from the Thor Lake Deposit ore has been detailed in Section 9 of this report. The important minerals are zircon, allanite, monazite, fergusonite, bastnaesite, and synchysite. The minerals of interest are fine-grained and typically in the 5 to 25 μm size range.

COMMINUTION

Five carefully selected composite samples of Upper Zone (UZ) and Basal Zone (BZ) material and waste rock were prepared and submitted to Starkey and Associates for SAG Design testing and to SGS Lakefield Research Limited for assessment of comminution properties.

SGS reported a Bond metric rod mill work index value of 16 kWh/t for a UZ sample and values of 14 kWh/t and 16.5 kWh/t for two BZ samples. The values show rock of average toughness according to the SGS database.

SGS measured the abrasion indices at 0.3 to 0.4 g indicating moderately abrasive material.

Bond ball mill work index tests returned metric values of about 15 kWh/t for all samples with very little variation when tested using 75 and 106 μm closing screens.

Based on the data, Melis Engineering designed a comminution circuit comprising crushing to -15 mm followed by rod and ball milling to achieve the target grind of 80% passing 38 μm .

The SAGDesign tests showed that the ore was amenable to semi-autogenous grinding (SAG) and this option may be examined again in future testwork and design studies.

FLOTATION

Numerous open circuit and locked cycle flotation tests have been done at SGS by Srdjan Bulatovic of SBM Mineral Processing and Engineering Services Ltd. Testwork is continuing but at the time of the pre-feasibility study, it had been established through work on numerous samples covering different ore grades and compositions that the flotation flowsheet should comprise grinding to 80% passing 38 μm , desliming at about 8 μm , the removal of magnetic materials followed by flotation.

The flotation process detailed in the pre-feasibility study comprised a partial solution change, conditioning, rougher-scavenger flotation, four stages of counter-current cleaning, and a gravity upgrading step.

At 18% mass pull to a final concentrate, the circuit described above was expected to yield 90% recovery of zirconium, 69% recovery of niobium, 63% recovery of tantalum, and 80% recovery of the rare earths and yttrium.

Optimization of mass pull (affecting concentrate handling and hydrometallurgical operating and capital costs) vs. recovery (affecting revenue) for the concentrator, and the evaluation of the response of other ore samples will be carried out at the Feasibility stage.

Testwork is continuing at SGS to evaluate other ore samples and to further increase the upgrading effect whilst holding, or improving, recovery levels through the rejection of biotite. When these tests are completed it is planned to operate a large-scale pilot plant

comprising grinding, feed preparation, and flotation to both demonstrate the process and generate a bulk sample for on-going hydrometallurgical work and, eventually, a hydrometallurgical pilot plant.

HYDROMETALLURGY

The minerals in the flotation concentrate are chemically refractory – especially zircon. Zircon is routinely decomposed (cracked) at several operations around the world using fused sodium hydroxide and this process has been extensively investigated by SGS Mineral Services on Thor Lake material. The tests have shown that caustic cracking will very effectively decompose not only the zircon but also all other value-bearing minerals.

In a typical test, for example CCr-27, concentrate was treated with sodium hydroxide at 600°C for three hours, cooled, then water washed to remove excess sodium hydroxide and the phosphates and silicates formed in the cracking process. The solids were then leached with hydrochloric acid and yielded 96% zirconium extraction and more than 96% solubilization of the rare earths.

Other approaches to the caustic cracking process have been investigated including cracking tests using sodium carbonate, cracking in an autoclave using strong caustic solution, cracking in the presence of reductants, and low temperature attrition milling with sodium hydroxide. Some of these tests provided encouraging results and further tests have been planned.

Another approach to cracking refractory minerals is acid baking in which the feed material is mixed with concentrated sulphuric acid and held at a temperature of 200°C or more for a few hours. This method is widely used in China for decomposing the rare earth concentrates from Bayan Obo and elsewhere.

SGS has investigated the use of acid baking for the Thor Lake concentrate and it has been seen to solubilize about 80% of the light rare earths and 50% of the heavy rare earths. Zircon extraction is minimal, less than 4%, even under extreme acid bake conditions clearly indicating the refractory nature of zircon.

SGS Mineral Services has also investigated the use of ammonium sulphate or ammonium chloride as acid baking reagents. Some elements were extracted but no further work is planned.

A combination of acid baking and caustic cracking has also been investigated and shown to offer high recoveries and preferred reagent consumption levels and operating costs. As reported in the previous Technical Report, extractions under favourable conditions are typified by the results of AB-19 in which overall zirconium recovery was 99%, overall light rare earth (lanthanum, cerium and neodymium) extraction was 98%, and extraction of the heavy rare earths and yttrium was 99%. Niobium extraction was 83%.

Although it is clear that a very effective process for solubilizing the valuable elements in the Thor Lake concentrate had been identified, testwork is continuing at SGS Mineral Services to further define the process parameters and optimize the flowsheet for the initial solubilization step.

Extracting valuable elements from the refractory minerals of the concentrate is a key part of the hydrometallurgical process. Once the elements of interest are in solution, it is necessary to separately recover the zirconium, rare earths, yttrium, niobium and tantalum and this has been investigated in the laboratory. The flowsheet that was selected for the pre-feasibility study comprises double salt precipitation of the light rare earths followed by sequential solvent extraction steps to isolate zirconium, the rare earths, niobium, and tantalum.

Double salt precipitation, which is a classic means of separating the light and heavy rare earths, involves the addition of sodium ion to a sulphate solution of the rare earth elements. This has been tested and the resulting product metathesized and dried to produce a light rare earth hydrated oxide precipitate. The yield of light rare earths to this precipitate was high (up to 96%) but some co-precipitation of yttrium and heavy rare earths was observed. This does not represent a loss of heavy rare earths since they report to the light rare earth product but further work is under way to optimize the double salt precipitation step and other solution operations.

Solution reduction tests have been completed and a suitable process developed. Solvent extraction tests have been done and more work is planned. Based on available data and published information from other proposed or actual solvent extraction plants, the plant included in the pre-feasibility study consisted of three sequential solvent extraction circuits for recovery of zirconium, rare earths, and niobium and tantalum.

It is expected that testwork will continue on all aspects of the hydrometallurgical process over the next several months and will culminate in a hydrometallurgical pilot plant planned for late 2011.

The net recoveries expected, as reported in the earlier Technical Report, are provided in Table 13-1. Testwork is continuing to confirm that these recoveries are obtainable from other samples from the Thor Lake project.

TABLE 13-1 FLOTATION AND HYDROMETALLURGICAL RECOVERIES
Avalon Rare Metals Inc. – Thor Lake Project

	Feed to Concentrate	Concentrate to Product	Net Recovery
ZrO ₂	89.7%	90.0%	80.7%
TREO	79.5%	93.0%	73.9%
HREO	79.5%	93.0%	73.9%
Nb ₂ O ₅	68.9%	80.0%	55.1%
Ta ₂ O ₅	63.0%	50.0%	31.5%

ONGOING TESTING

Since the PFS, Avalon has completed numerous bench scale flotation tests to optimize the flotation reagent suite and investigate the response of different ore types. This work has been performed by SGS in Lakefield, Ontario, Xstrata Process Support (XPS) in Sudbury, Ontario; and the Baogang Research Institute of Mining in Baotou, China. Additionally, Avalon commissioned XPS to execute two mini-pilot plant (MPP) operations using 1.7 t and 1.2 t of crushed drill core each as reported by Avalon in press releases on January 27, 2011 and April 5, 2011.

At the present time, SGS is conducting a medium scale flotation operation at Lakefield using 3.7 t of crushed drill core to produce concentrate for large-scale hydrometallurgical testing. A flotation pilot plant using approximately 30 t of crushed drill core is scheduled for late 2011.

Since the PFS, FLSmidth Salt Lake City, Inc., has been retained to prepare a detailed design, and capital and operating cost estimates for the proposed crushing and flotation plants located at Thor Lake.

SGS has continued with its investigation into the hydrometallurgical processing of flotation concentrate to extract the contained zirconium, rare earth elements, niobium and tantalum. The general processing methods outlined in the PFS and in subsequent press releases remain the route of interest with bench testwork now aimed at optimizing and further defining the various operating steps. A hydrometallurgical pilot plant is planned for late 2011 and 2012 and SGS is acquiring necessary equipment for this at the time of writing.

14 MINERAL RESOURCE ESTIMATE

GENERAL STATEMENT

The Mineral Resource estimate for the Nechalacho deposit used in the PFS was updated with new drilling by Avalon, as disclosed on January 27, 2011. This updated estimate was used as the basis for the UPFS.

The technical data used for the Mineral Resource estimate was compiled, validated and evaluated by Avalon. Avalon also updated the 3D solids and interpolated grade values for oxides of the REE elements, Zr, Nb, Ga, Hf, Th and Ta into the block model.

RPA validated the data set and the wireframes, and reviewed the interpolation methodology and the block model. RPA also reclassified a small quantity of Inferred Resources to Indicated Resources.

The Mineral Resource estimate is summarized using a Net Metal Return (NMR) per tonne cut-off value (Table 14-1). This is an economic number rather than an oxide cut-off grade, as used in the Avalon 2011 and Scott Wilson RPA 2010 reports. The cut-off parameters are explained further under 'Cut-Off Grade', below. Detailed resource tables, including the individual oxide grades, are included at the end of this section.

TABLE 14-1 MINERAL RESOURCE SUMMARY – JANUARY 27, 2011
Avalon Rare Metals Inc. – Thor Lake Project

Area	Tonnes (millions)	TREO (%)	HREO (%)	ZrO ₂ (%)	Nb ₂ O ₅ (%)	Ta ₂ O ₅
Basal Zone Indicated						
Tardiff Lake	41.72	1.61	0.34	2.99	0.41	397
West Long Lake	16.11	1.42	0.31	2.98	0.38	392
Total Indicated	57.82	1.56	0.33	2.99	0.40	396
Basal Zone Inferred						
Tardiff Lake	19.18	1.66	0.36	3.08	0.42	423
Thor Lake	79.27	1.30	0.24	2.78	0.37	338
West Long Lake	8.82	1.16	0.21	2.71	0.33	346
Total Inferred	107.26	1.35	0.26	2.83	0.37	354
Upper Zone Indicated						
Tardiff Lake	23.63	1.50	0.15	2.09	0.32	194
West Long Lake	7.02	1.40	0.13	2.14	0.27	186
Total Indicated	30.64	1.48	0.15	2.10	0.31	192
Upper Zone Inferred						
Tardiff Lake	28.66	1.34	0.12	1.96	0.32	175
Thor Lake	81.66	1.24	0.12	2.54	0.36	206
West Long Lake	5.67	1.34	0.12	1.95	0.26	170
Total Inferred	115.98	1.27	0.12	2.37	0.34	196
Total Indicated						
Upper & Basal	88.46	1.53	0.27	2.68	0.37	325
Total Inferred						
Upper & Basal	223.24	1.31	0.19	2.59	0.36	272

Notes:

- 1) CIM definitions were followed for Mineral Resources.
- 2) HREO (Heavy Rare Earth Oxides) is the total concentration of: Y₂O₃, Eu₂O₃, Gd₂O₃, Tb₂O₃, Dy₂O₃, Ho₂O₃, Er₂O₃, Tm₂O₃, Yb₂O₃ and Lu₂O₃.
- 3) TREO (Total Rare Earth Oxides) is HREO plus: La₂O₃, Ce₂O₃, Pr₂O₃, Nd₂O₃ and Sm₂O₃.
- 4) Mineral Resources are estimated using price forecasts for 2014 for rare metals prepared early in 2010 for the PFS. Rare earths were valued at an average net price of US\$21.94/kg, ZrO₂ at US\$3.77/kg, Nb₂O₅ at US\$45/kg, and Ta₂O₅ at US\$130/kg.
- 5) A cut-off NMR value of C\$260 per tonne, equal to the PFS average operating cost, was used. NMR is defined as "Net Metal Return" or the in situ value of all the payable rare metals in the ore, net of estimated metallurgical recoveries and off-site processing costs.
- 6) An exchange rate of 1.11 was used.
- 7) ZrO₂ refers to Zirconium Oxide, Nb₂O₅ refers to Niobium Oxide, Ta₂O₅ refers to Tantalum Oxide, Ga₂O₃ refers to Gallium Oxide.
- 8) Mineral Resources are inclusive of Mineral Reserves.

MINERAL RESOURCE DATABASE

The Mineral Resource estimate for the Nechalacho deposit is based upon detailed core logging, assays and geological interpretation by Avalon's consulting geologists. In total, 291 drill holes (out of a database of 316 drill holes) were used for the estimate of which 45 are historic and 246 are Avalon diamond drill holes (drilled and sampled from 2007 to 2010). Complete REE analyses (plus Zr, Nb, Ga, and Ta) are available for six historic holes and all 246 Avalon holes. These holes and their related assays form the basis for the creation of two domains of REE mineralization: an upper light rare earth element-enriched domain, the Upper Zone, and a lower heavy rare earth element-enriched domain, the Basal Zone.

Nineteen of Avalon's drill holes were not used in the estimate, either due to the entire hole encountering diabase and being abandoned (five holes), or due to being outside the limits of the model (15 holes). Of the latter, a number of holes and in particular L10-309, L10-310, L10-311 encountered significant intersections of mineralization.

Table 14-2 displays the source and number of drill holes used for the resource estimate. Table 14-3 shows the number of partial or complete REE analyses completed by both Avalon and other companies and includes diamond drill holes outside the resource.

TABLE 14-2 DRILL HOLE INFORMATION FOR THIS RESOURCE ESTIMATE
Avalon Rare Metals Inc. – Thor Lake Project

Data Source	Number of Holes	Metres	Years	Notes
Other Companies	45	5,242	1978 to 1988	Not all information could be validated
Avalon	246	54,611	2007 to 2010	Metreage does not include restarted holes
Totals	291	59,853		

TABLE 14-3 ASSAY SUMMARY
Avalon Rare Metals Inc. – Thor Lake Project

Data Source	Holes with no REE Analyses	Holes with partial REE Analyses	Holes with Complete REE Analyses	Total
Other Companies	10	35	6	51
Avalon	5	0	260	265
Totals	15	35	266	316

Table 14-4 displays the number of samples for each element in the database (including drill holes outside the limits of model). Some of these holes were used for geological modeling however to better define the limits of model. Also included are five Avalon holes that were restarted (due to diabase).

TABLE 14-4 SAMPLE INFORMATION
Avalon Rare Metals Inc. – Thor Lake Project

Element	Samples	Comments
Y	26,455	Number reflects additional analyses from pre-Avalon holes
La	25,193	Number reflects additional analyses from pre-Avalon holes
Ce	26,453	Number reflects additional analyses from pre-Avalon holes
Pr	25,106	Avalon analyses only
Nd	25,106	Avalon analyses only
Sm	25,106	Avalon analyses only
Eu	25,106	Avalon analyses only
Gd	25,106	Avalon analyses only
Tb	25,106	Avalon analyses only
Dy	25,106	Avalon analyses only
Ho	25,106	Avalon analyses only
Er	25,106	Avalon analyses only
Tm	25,106	Avalon analyses only
Yb	25,106	Avalon analyses only
Lu	25,106	Avalon analyses only
Zr	26,865	Number reflects additional analyses from pre-Avalon holes
Nb	26,224	Number reflects additional analyses from pre-Avalon holes
Ta	26,138	Number reflects additional analyses from pre-Avalon holes
Ga	23,982	Number includes additional analyses from pre-Avalon holes
Hf	24,817	Number includes additional analyses from pre-Avalon holes
Th	25,106	Avalon analyses only
U	25,253	Number reflects additional analyses from pre-Avalon holes

GEOLOGICAL INTERPRETATION

As previously mentioned, two zones of REE enrichment have been defined for the Nechalacho Deposit. The upper and lower contacts for the Basal and Upper Zones (BZ and UZ respectively) are defined on the basis of significant changes in HREO% and TREO%. These surfaces were clipped against a perimeter bounding surface to define the UZ and BZ.

The base of the BZ is interpreted as a hard boundary that is generally defined by a strong increase in the HREO% and TREO%. In some drill holes the contact is not as

sharp and the boundary was placed at the start of the increase in HREO% and TREO%. This is a conservative approach that captures a certain amount of lower grade mineralization into the modeled mineralized zone. The upper boundary of the BZ was generally defined as a soft contact where the TREO% was greater than 1% and the HREO% was greater than 0.15%. The volume between the top of the BZ and the base of the overburden/water was flagged as UZ. Where there were sharply defined zones of waste above the last zones of mineralization in the upper zone (toward surface), these areas were also excluded. The model used the Grace Lake Granite as the southernmost extent of the both the Upper and Basal Zones. In general the model in the remaining azimuths was clipped to the last intersections of the Basal Zone. Some holes with significant intercepts, located to the north of the resource, were not included due to their distance to the nearest adjoining drill hole.

BASIC STATISTICS AND CAPPING OF HIGH ASSAYS

The basic statistics of the assay used for compositing are listed in the Table 14-5.

TABLE 14-5 RAW ASSAY DESCRIPTIVE STATISTICS
Avalon Rare Metals Inc. – Thor Lake Project

Assay Statistics for entire area (including Upper and Basal Zones but not limited to)*

assays

Rows by: Fields
Columns by: Statistics

	Valid	Rejected	Total Weight	Sum	Minimum	Maximum	Mean	Std. Devn.	Variance	Co. of Variation
Y203	52,802	0	0.0	24,723,030.00	0.000	16,433.500	468.221	837.194	700,893.000	1.788
LA203	52,802	0	0.0	61,507,510.00	0.000	242,811.000	1,164.871	1,841.770	3,392,116.000	1.581
CE203	52,802	0	0.0	140,373,700.00	0.000	106,561.000	2,658.492	3,302.845	10,908,790.000	1.242
PR203	52,802	0	0.0	17,066,680.00	0.000	6,840.150	323.220	399.260	159,408.800	1.235
ND203	52,802	0	0.0	66,004,280.00	0.000	53,169.600	1,250.034	1,574.171	2,478,014.000	1.259
SM203	52,802	0	0.0	12,801,010.00	0.000	5,800.000	242.434	307.431	94,513.930	1.268
EU203	52,802	0	0.0	1,463,074.00	0.000	625.320	27.709	35.786	1,280.667	1.292
GD203	52,802	0	0.0	10,415,190.00	0.000	5,765.000	197.250	256.457	65,770.110	1.300
TB203	52,802	0	0.0	1,307,200.00	0.000	665.280	24.757	36.531	1,334.530	1.476
DY203	52,802	0	0.0	5,763,918.00	0.000	3,134.040	109.161	188.493	35,529.640	1.727
HO203	52,802	0	0.0	935,221.90	0.000	680.720	17.712	34.389	1,182.636	1.942
ER203	52,802	0	0.0	2,347,053.00	0.000	1,497.330	44.450	88.877	7,899.051	1.999
TM203	52,802	0	0.0	294,242.50	0.000	161.020	5.573	11.736	137.726	2.106
YB203	52,802	0	0.0	1,770,785.00	0.000	951.620	33.536	69.130	4,779.015	2.061
LU203	52,802	0	0.0	246,563.30	0.000	139.280	4.670	9.713	94.336	2.080
TA205	52,802	0	0.0	6,512,652.00	0.000	1,630.040	123.341	157.392	24,772.110	1.276
NB205	52,802	0	0.0	87,217,090.00	0.000	22,049.800	1,651.776	1,833.630	3,362,201.000	1.110
ZR02	52,802	0	0.0	582,505,800.00	0.000	135,776.000	11,031.890	14,006.160	196,172,600.000	1.270
GA203	52,802	0	0.0	6,361,395.00	0.000	650.500	120.476	71.153	5,062.784	0.591
HF02	52,802	0	0.0	11,178,330.00	0.000	2,725.970	211.703	266.992	71,284.830	1.261
TH02	52,802	0	0.0	3,544,077.00	0.000	2,258.930	67.120	93.207	8,687.509	1.389

* Note that total number of assays is not the same with the number of samples, as MineSight splits assays at changes in database interval tables (lithology, downhole survey, density etc.)

Assay Statistics for Upper Zone*

assays by lens

Filter : 2

Rows by: Fields
Columns by: Statistics

	Valid	Rejected	Total Weight	Sum	Minimum	Maximum	Mean	Std. Devn.	Variance	Co. of Variation
Y203	27,599	0	0.0	9,309,357.00	0.000	6,053.130	337.308	418.061	174,774.900	1.239
LA203	27,599	0	0.0	37,757,530.00	0.000	242,811.000	1,368.076	2,177.957	4,743,496.000	1.592
CE203	27,599	0	0.0	86,703,260.00	0.000	106,561.000	3,141.536	3,452.493	11,919,710.000	1.099
PR203	27,599	0	0.0	10,391,950.00	0.000	6,142.500	376.534	408.195	166,623.400	1.084
ND203	27,599	0	0.0	39,958,960.00	0.000	53,169.600	1,447.841	1,622.346	2,632,007.000	1.121
SM203	27,599	0	0.0	7,328,361.00	0.000	5,800.000	265.530	291.905	85,208.540	1.099
EU203	27,599	0	0.0	787,362.50	0.000	625.320	28.529	31.316	980.720	1.098
GD203	27,599	0	0.0	5,527,785.00	0.000	5,765.000	200.289	220.647	48,684.900	1.102
TB203	27,599	0	0.0	588,726.60	0.000	665.280	21.331	24.294	590.219	1.139
DY203	27,599	0	0.0	2,206,219.00	0.000	2,209.900	79.938	97.387	9,484.154	1.218
HO203	27,599	0	0.0	317,921.30	0.000	333.490	11.519	15.092	227.774	1.310
ER203	27,599	0	0.0	769,820.00	0.000	734.950	27.893	36.180	1,308.993	1.297
TM203	27,599	0	0.0	88,697.05	0.000	103.350	3.214	4.487	20.129	1.396
YB203	27,599	0	0.0	552,290.40	0.000	720.990	20.011	28.442	808.951	1.421
LU203	27,599	0	0.0	76,613.49	0.000	109.830	2.776	4.113	16.919	1.482
TA205	27,599	0	0.0	3,049,017.00	0.000	1,241.020	110.476	101.229	10,247.260	0.916
NB205	27,599	0	0.0	49,354,230.00	0.000	22,049.800	1,788.262	1,633.235	2,667,455.000	0.913
ZRO2	27,599	0	0.0	301,184,700.00	0.000	112,403.000	10,912.880	12,131.580	147,175,100.000	1.112
GA203	27,599	0	0.0	4,020,932.00	0.000	650.500	145.691	65.677	4,313.459	0.451
HFO2	27,599	0	0.0	5,488,148.00	0.000	2,725.970	198.853	217.197	47,174.430	1.092
THO2	27,599	0	0.0	2,076,612.00	0.000	2,258.930	75.242	86.588	7,497.539	1.151

* Note that total number of assays is not the same with the number of samples, as MineSight splits assays at changes in database interval tables (lithology, downhole survey, density etc.)

Assay Statistics for Basal Zone*

assays by lens

Filter : 1

Rows by: Fields
Columns by: Statistics

	Valid	Rejected	Total Weight	Sum	Minimum	Maximum	Mean	Std. Devn.	Variance	Co. of Variation
Y203	8,281	0	0.0	13,442,750.00	0.000	16,433.500	1,623.324	1,464.290	2,144,146.000	0.902
LA203	8,281	0	0.0	20,176,110.00	0.000	31,660.900	2,436.434	1,406.060	1,977,005.000	0.577
CE203	8,281	0	0.0	45,578,370.00	0.000	58,550.000	5,503.970	3,168.447	10,039,060.000	0.576
PR203	8,281	0	0.0	5,710,512.00	0.000	6,840.150	689.592	395.033	156,050.700	0.573
ND203	8,281	0	0.0	22,358,550.00	0.000	13,350.700	2,699.982	1,539.387	2,369,713.000	0.570
SM203	8,281	0	0.0	4,771,864.00	0.000	2,817.430	576.243	336.057	112,934.000	0.583
EU203	8,281	0	0.0	592,084.80	0.000	309.190	71.499	42.158	1,777.326	0.590
GD203	8,281	0	0.0	4,274,991.00	0.000	2,498.110	516.241	308.062	94,901.940	0.597
TB203	8,281	0	0.0	631,620.60	0.000	474.210	76.273	53.773	2,891.499	0.705
DY203	8,281	0	0.0	3,133,267.00	0.000	3,134.040	378.368	316.844	100,390.200	0.837
HO203	8,281	0	0.0	544,684.60	0.000	680.720	65.775	61.832	3,823.212	0.940
ER203	8,281	0	0.0	1,393,676.00	0.000	1,497.330	168.298	162.702	26,471.960	0.967
TM203	8,281	0	0.0	181,739.60	0.000	161.020	21.947	21.710	471.316	0.989
YB203	8,281	0	0.0	1,076,697.00	0.000	951.620	130.020	126.124	15,907.270	0.970
LU203	8,281	0	0.0	149,709.80	0.000	139.280	18.079	17.747	314.971	0.982
TA205	8,281	0	0.0	3,005,458.00	0.000	1,630.040	362.934	201.802	40,723.870	0.556
NB205	8,281	0	0.0	31,531,050.00	0.000	21,367.400	3,807.638	1,940.411	3,765,195.000	0.510
ZRO2	8,281	0	0.0	234,819,800.00	0.000	135,776.000	28,356.450	16,732.050	279,961,500.000	0.590
GA203	8,281	0	0.0	1,127,364.00	0.000	337.340	136.139	49.122	2,413.002	0.361
HFO2	8,281	0	0.0	4,664,883.00	0.000	2,547.350	563.324	331.946	110,188.100	0.589
THO2	8,281	0	0.0	1,169,103.00	0.000	1,513.540	141.179	132.121	17,455.930	0.936

* Note that total number of assays is not the same with the number of samples, as MineSight splits assays at changes in database interval tables (lithology, downhole survey, density etc.)

No capping of high assay values was considered necessary, as indicated by the coefficient of variation for each of the elements in the Upper and Basal Zones.

COMPOSITES

Two-meter composites were created for each element from the raw assays in the database. These composites were constrained by the upper and lower boundaries of the Upper and Basal Zones and flagged with the appropriate zone code. Composites were

not extracted from the diabase dykes that cross-cut the deposit. All the composites resulted were used for interpolation.

Usually, the composites shorter than 25% of the fixed length composite interval of 2 m (i.e., 0.5 m) are discarded. The number of composites shorter than 0.5 m for the Basal Zone is 38 out of 4391, and for the Upper Zone 53 out of 15002 composites. The short composites represent a very small proportion of the total number of composites and do not bias the data.

The basic statistics of the composites are listed in the Table 14-6. The resource estimate is based on composites from the Upper and Basal Zones

TABLE 14-6 COMPOSITES DESCRIPTIVE STATISTICS
Avalon Rare Metals Inc. – Thor Lake Project

Composite Statistics for entire area (including Upper and Basal Zones but not limited to)
composites

Rows by: Fields
Columns by: Statistics

	Valid	Rejected	Total Weight	Sum	Minimum	Maximum	Mean	Std. Devn.	Variance	Co. of Variation
Y203	32,863	0	0.0	13,229,890	0.0	16,434.0	402.6	757.8	574,272.5	1.9
LA203	32,863	0	0.0	31,807,560	0.0	131,069.0	967.9	1,741.2	3,031,743.0	1.8
CE203	32,863	0	0.0	74,519,060	0.0	98,724.0	2,267.6	3,043.4	9,262,406.0	1.3
PR203	32,863	0	0.0	8,740,071	0.0	5,850.0	266.0	364.4	132,784.5	1.4
ND203	32,863	0	0.0	33,802,590	0.0	37,805.0	1,028.6	1,427.9	2,038,912.0	1.4
SM203	32,863	0	0.0	6,555,597	0.0	4,515.0	199.5	281.2	79,076.3	1.4
EU203	32,863	0	0.0	750,263	0.0	473.0	22.8	32.9	1,079.3	1.4
GD203	32,863	0	0.0	5,336,776	0.0	4,203.0	162.4	234.6	55,026.2	1.4
TB203	32,863	0	0.0	674,138	0.0	474.0	20.5	33.4	1,117.9	1.6
DY203	32,863	0	0.0	2,994,063	0.0	3,123.0	91.1	171.6	29,436.6	1.9
HO203	32,863	0	0.0	488,065	0.0	681.0	14.9	31.2	975.2	2.1
ER203	32,863	0	0.0	1,224,238	0.0	1,497.0	37.3	80.7	6,516.1	2.2
TM203	32,863	0	0.0	154,064	0.0	154.0	4.7	10.7	114.4	2.3
YB203	32,863	0	0.0	926,878	0.0	864.0	28.2	63.0	3,964.7	2.2
LU203	32,863	0	0.0	129,048	0.0	133.0	3.9	8.8	78.0	2.2
TA205	32,863	0	0.0	3,504,613	0.0	1,630.0	106.6	148.4	22,008.9	1.4
NB205	32,863	0	0.0	47,186,460	0.0	17,517.0	1,435.9	1,731.1	2,996,719.0	1.2
ZR02	32,863	0	0.0	312,124,700	0.0	129,021.0	9,497.8	13,065.7	170,712,100.0	1.4
GA203	32,863	0	0.0	3,292,120	0.0	629.0	100.2	77.6	6,020.9	0.8
HFO2	32,863	0	0.0	5,758,806	0.0	2,522.0	175.2	247.3	61,150.5	1.4
THO2	32,863	0	0.0	1,825,546	0.0	1,904.0	55.6	82.8	6,850.8	1.5

Composite Statistics for Upper Zone

composites by lens

Filter : 2

Rows by: Fields
Columns by: Statistics

	Valid	Rejected	Total Weight	Sum	Minimum	Maximum	Mean	Std. Devn.	Variance	Co. of Variation
Y203	15,002	0	0.0	4,923,887	0.0	4,768.0	328.2	371.4	137,968.3	1.1
LA203	15,002	0	0.0	19,243,020	0.0	131,069.0	1,282.7	2,179.6	4,750,471.0	1.7
CE203	15,002	0	0.0	45,634,220	0.0	98,724.0	3,041.9	3,226.1	10,407,780.0	1.1
PR203	15,002	0	0.0	5,216,624	0.0	5,850.0	347.7	376.8	141,963.2	1.1
ND203	15,002	0	0.0	20,043,060	0.0	37,805.0	1,336.0	1,478.3	2,185,327.0	1.1
SM203	15,002	0	0.0	3,670,806	0.0	4,515.0	244.7	268.4	72,030.7	1.1
EU203	15,002	0	0.0	394,174	0.0	473.0	26.3	28.8	827.7	1.1
GD203	15,002	0	0.0	2,764,585	0.0	4,203.0	184.3	201.3	40,507.4	1.1
TB203	15,002	0	0.0	295,176	0.0	473.0	19.7	22.2	491.1	1.1
DY203	15,002	0	0.0	1,110,054	0.0	1,726.0	74.0	88.2	7,784.3	1.2
HO203	15,002	0	0.0	160,555	0.0	310.0	10.7	13.8	190.6	1.3
ER203	15,002	0	0.0	388,498	0.0	682.0	25.9	33.1	1,097.3	1.3
TM203	15,002	0	0.0	44,852	0.0	84.0	3.0	4.1	17.1	1.4
YB203	15,002	0	0.0	280,056	0.0	583.0	18.7	26.2	684.9	1.4
LU203	15,002	0	0.0	38,774	0.0	89.0	2.6	3.8	14.5	1.5
TA205	15,002	0	0.0	1,634,912	0.0	890.0	109.0	95.4	9,096.2	0.9
NB205	15,002	0	0.0	26,654,270	0.0	17,517.0	1,776.7	1,530.7	2,343,138.0	0.9
ZR02	15,002	0	0.0	160,015,900	0.0	100,871.0	10,666.3	11,334.9	128,480,700.0	1.1
GA203	15,002	0	0.0	2,026,316	0.0	629.0	135.1	72.1	5,203.1	0.5
HFO2	15,002	0	0.0	2,740,390	0.0	1,979.0	182.7	199.9	39,975.2	1.1
THO2	15,002	0	0.0	1,049,814	0.0	1,904.0	70.0	78.5	6,155.2	1.1

Composite Statistics for Basal Zone

composites by lens

Filter : 1

Rows by: Fields
Columns by: Statistics

	Valid	Rejected	Total Weight	Sum	Minimum	Maximum	Mean	Std. Devn.	Variance	Co. of Variation
Y203	4,391	0	0.0	7,160,944	0.0	16,434.0	1,630.8	1,372.5	1,883,758.0	0.8
LA203	4,391	0	0.0	10,575,800	0.0	13,988.0	2,408.5	1,313.0	1,723,961.0	0.5
CE203	4,391	0	0.0	24,137,300	0.0	26,905.0	5,497.0	2,922.1	8,538,410.0	0.5
PR203	4,391	0	0.0	2,988,754	0.0	3,158.0	680.7	372.0	138,393.5	0.5
ND203	4,391	0	0.0	11,714,650	0.0	10,552.0	2,667.9	1,465.3	2,147,210.0	0.5
SM203	4,391	0	0.0	2,495,344	0.0	2,297.0	568.3	320.1	102,470.0	0.6
EU203	4,391	0	0.0	309,661	0.0	309.0	70.5	40.3	1,627.3	0.6
GD203	4,391	0	0.0	2,232,682	0.0	2,191.0	508.5	293.6	86,173.5	0.6
TB203	4,391	0	0.0	330,870	0.0	474.0	75.4	51.1	2,615.5	0.7
DY203	4,391	0	0.0	1,648,857	0.0	3,123.0	375.5	300.3	90,189.4	0.8
HO203	4,391	0	0.0	287,248	0.0	681.0	65.4	58.7	3,442.5	0.9
ER203	4,391	0	0.0	733,816	0.0	1,497.0	167.1	155.0	24,011.3	0.9
TM203	4,391	0	0.0	95,915	0.0	154.0	21.8	20.8	433.4	1.0
YB203	4,391	0	0.0	567,634	0.0	864.0	129.3	120.8	14,604.1	0.9
LU203	4,391	0	0.0	78,895	0.0	133.0	18.0	16.9	287.2	0.9
TA205	4,391	0	0.0	1,602,041	0.0	1,630.0	364.8	191.6	36,721.1	0.5
NB205	4,391	0	0.0	16,760,750	0.0	15,994.0	3,817.1	1,814.3	3,291,733.0	0.5
ZR02	4,391	0	0.0	125,246,200	0.0	129,021.0	28,523.4	15,915.8	253,313,300.0	0.6
GA203	4,391	0	0.0	591,865	0.0	313.0	134.8	49.5	2,447.8	0.4
HFO2	4,391	0	0.0	2,450,266	0.0	2,522.0	558.0	319.4	101,989.3	0.6
THO2	4,391	0	0.0	609,674	0.0	1,083.0	138.8	121.9	14,854.6	0.9

CUT-OFF GRADE

RPA recognizes that both rare metals and rare earths contribute to the total revenue of the Nechalacho deposit.

An economic model was created, using metal prices, flotation and hydrometallurgical recoveries, the effects of payable percentages, and any payable NSR Royalties. The net revenue generated by this model is termed the Net Metal Return (NMR). This resource estimate is based on the minimum NMR value being equal to an operating cost of C\$260 per tonne, a break-even cut-off value.

RPA notes that both the operating cost and the price basis for the NMR use PFS values. The UPFS includes marginally higher operating costs (C\$269 per tonne) and higher prices (US\$46.31 per kg rare earths, vs. US\$21.94 per kg). RPA recommends that the cut-off value for the Mineral Resources be updated. The expected effect is that some quantity of lower-grade mineralization would be added to the Mineral Resource estimate. No effect on the Mineral Reserves is expected, as they are already a smaller, high-grade subset of the Mineral Resources.

TABLE 14-7 CALCULATION METAL VALUES
Avalon Rare Metals Inc. – Thor Lake Project

Oxide	Price (US\$/kg)	Flotation Recovery	Hydromet Recovery	Payable Percentage	Net Value (US\$/kg)	Net Value (C\$/kg)
NbO ₅	\$ 45.00	69%	80%	100%	24.8	27.53
ZrO ₂	\$ 3.77	90%	90%	100%	3.04	3.38
Ta ₂ O ₃	\$ 130.00	63%	50%	100%	40.95	45.45
Ga ₂ O ₃	-	10%	60%	74%	-	-
Y ₂ O ₃	\$ 23.22	80%	93%	70%	12.02	13.34
Eu ₂ O ₃	\$1,086.10	80%	93%	70%	562.11	623.94
Gd ₂ O ₃	\$ 13.39	80%	93%	70%	6.93	7.69
Tb ₂ O ₃	\$1,166.09	80%	93%	70%	603.5	669.89
Dy ₂ O ₃	\$ 254.59	80%	93%	70%	131.76	146.26
Ho ₂ O ₃	\$ 64.85	80%	93%	70%	33.56	37.25
Er ₂ O ₃	\$ 47.81	80%	93%	70%	24.74	27.47
Tm ₂ O ₃	-	80%	93%	0%	-	-
Yb ₂ O ₃	-	80%	93%	0%	-	-
Lu ₂ O ₃	\$ 510.97	80%	93%	70%	264.45	293.54
La ₂ O ₃	\$ 4.06	80%	93%	50%	1.5	1.67
Ce ₂ O ₃	\$ 2.08	80%	93%	50%	0.77	0.85
Pr ₂ O ₃	\$ 43.87	80%	93%	50%	16.22	18
Nd ₂ O ₃	\$ 46.06	80%	93%	50%	17.03	18.9
Sm ₂ O ₃	\$ 5.58	80%	93%	50%	2.06	2.29
HfO ₂	-	0%	0%	0%	-	-
ThO ₂	-	0%	0%	0%	-	-

SPECIFIC GRAVITY

Details on the collection of specific gravity data are presented in Section 11. Specific gravity values for composites were populated by direct assignment when the composite interval included the measurement point, or interpolated between the closest two measurement points for the composites without a measurement point.

DATABASE VALIDATION

The database content has been verified and validated by Wardrop (2009), Scott Wilson RPA (2010), Avalon (2011), and RPA (2011). The RPA 2011 verification and validation included assay data and conversion of metallic elements to oxides, collar positions, drill hole path, as well as GEMS project validation procedures. RPA concluded that the database is acceptable for mineral resource estimation purposes.

BLOCK MODEL AND GRADE ESTIMATION

A block model was created to cover the known geological extents of the deposit. The block model location and size are described in Table 14-8. Geological solids were created using the upper and lower surfaces for the UZ and BZ constrained by the bounding perimeter surface. Drill holes were back-tagged with the appropriate solids name to facilitate statistical analysis and interpolation.

TABLE 14-8 BLOCK MODEL COORDINATES
Avalon Rare Metals Inc. – Thor Lake Project

Element	X (m)	Y (m)	Z (m)
Origin	415000	6885000	-100
Block size	10	10	5
Block count	300	400	80

VARIOGRAPHY

Variographic analysis performed by Avalon and RPA for TREO, HREO, ZrO₂, Nb₂O₅, Ta₂O₅, Dy₂O₃ and Tb₂O₃ concluded that there was no strong directionality; however, the omnidirectional variogram indicates a range of approximately 70 meters for most of the elements. A set of HREO variograms with multiple orientations are displayed in Figure 14-1.

Variography should be attempted again as new drill hole data becomes available, and also subdomaining of the Basal and Upper Zones should be investigated.

FIGURE 14-1 GLOBAL VARIOGRAM OF HREO



INTERPOLATION AND SEARCH STRATEGY

The resource estimate is based on an IDW² interpolation method for the 15 REOs plus six other metal oxides. A two pass, anisotropic search was used, with a horizontal search ellipse for block grade interpolation. Block density was interpolated in a single pass anisotropic search, with a horizontal search ellipse.

A hard boundary was imposed on data from the Upper Zone and Basal Zone. There was no unfolding or unwrinkling applied to the composites, as no strong evidence was found to support the “flat base” hypothesis that drove the Wardrop 2009 and Scott Wilson RPA 2010 models.

In the Upper Zone, for grade interpolation, the first pass used an ellipse with radii of 60 m major, 60 m intermediary, and 30 m minor, requiring a minimum of two drill holes for interpolation. The second pass had a similar search ellipse, but the minimum number of drill holes required was set to one.

In the Basal Zone, the grade interpolation employed a first pass identical to the first pass in the Upper Zone, while the second pass had ellipse radii of 240 m major, 240 m intermediary and 120 m minor.

The block density employed a horizontal search ellipse with radii of 240 m major, 240 m intermediary and 120 m minor.

The search ellipse and interpolation strategy details are listed in Table 14-9.

TABLE 14-9 INTERPOLATION AND SEARCH PARAMETERS
Avalon Rare Metals Inc. – Thor Lake Project

Domain Interpolation method	Grade interpolation				Density interpolation
	Upper Zone IDW ²	Upper Zone IDW ²	Basal Zone IDW ²	Basal Zone IDW ²	Upper and Basal Zones ID ²
Pass	1	2	1	2	1
Search ellipse					
Major	60 m	240 m	60 m	240 m	240 m
Intermediary	60 m	240 m	60 m	240 m	240 m
Minor	30 m	120 m	30 m	120 m	120 m
Ellipse orientation	horizontal	horizontal	horizontal	horizontal	horizontal
Composites					
Min	4	3	4	4	1
Max	8	15	8	8	8
max per hole	3	15	3	8	3

RESOURCE CLASSIFICATION

The deposit was separated into three domains, Tardiff Lake, West Long Lake and Thor Lake, as shown in Figure 14-2, based on drilling density. The resource blocks in Thor Lake domain were classified as Inferred. The resource blocks in the Tardiff Lake and West Long Lake domains were classified based on distance from drill holes.

Tardiff Lake and West Long Lake resource blocks in Basal Zone were classified as Indicated if located within 60 metres from a drill hole. In the Upper Zone the Indicated blocks are within 60 metres of two drill holes. The rest of the resource blocks are classified as Inferred.

During review of the mine design, RPA noted that a small quantity of Inferred Resources were included inside the stope outlines (approximately 330,000 tonnes, or 2% of the

Mineral Reserve). This material is largely located at the ends or bottoms of stopes, within a metre or two of the Indicated Resource boundary.

RPA reclassified this material as Indicated Resources, and left it within the Mineral Reserves.

FIGURE 14-2 ORE ZONES BY DOMAIN

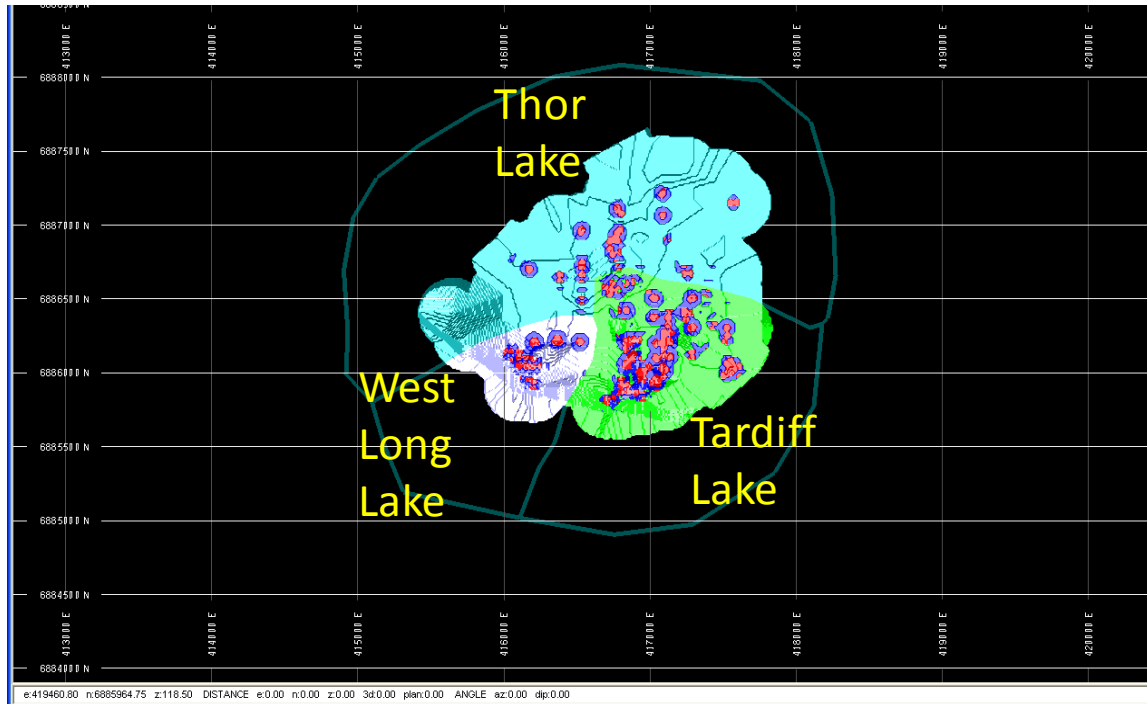


TABLE 14-10 RESOURCE CLASSIFICATION
Avalon Rare Metals Inc. – Thor Lake Project

Zone	Classification	Domain		
		Tardiff Lake	West Long Lake	Thor Lake
Basal	Indicated	< 60 m	< 60 m	-
	Inferred	60 m - 240 m	60 m - 240 m	0 m - 240 m
Upper	Indicated	< 60 m, 2 hole min	< 60 m, 2 hole min	-
	Inferred	60m - 240 m, 2 hole min	60m - 240 m, 2 hole min	0 m - 240 m, 2 hole min

MINERAL RESOURCE ESTIMATE

The Mineral Resource estimate is summarized at the start of the section. Tables 14-11 and 14-12 list the Mineral Resource at various cut-off values. Table 14-13 contains the resource breakdown by individual oxide and REO ratios, as well as by domain, classification and cut-off value.

TABLE 14-11 INDICATED MINERAL RESOURCES
Avalon Rare Metals Inc. – Thor Lake Project

Zone	NMR Cut-Off Value	Tonnes (millions)	TREO (%)	HREO (%)	ZrO ₂ (%)	Nb ₂ O ₅ (%)	Ta ₂ O ₅
Basal	>\$260	57.82	1.56	0.33	2.99	0.40	396
	>\$400	39.79	1.77	0.39	3.41	0.45	448
	>\$600	14.67	2.19	0.54	4.22	0.53	552
	>\$700	7.26	2.43	0.62	4.64	0.58	621
Upper	>\$260	30.64	1.48	0.15	2.10	0.31	192
	>\$400	6.25	2.20	0.21	2.95	0.40	243
	>\$600	0.61	4.31	0.36	3.87	0.51	286
	>\$700	0.27	6.11	0.45	3.93	0.52	260
Total	>\$260	88.46	1.53	0.26	2.68	0.37	325
	>\$400	46.04	1.83	0.37	3.34	0.44	420
	>\$600	15.28	2.27	0.53	4.21	0.53	541
	>\$700	7.52	2.53	0.62	4.61	0.58	608

Notes:

- 1) CIM definitions were followed for Mineral Resources.
- 2) HREO (Heavy Rare Earth Oxides) is the total concentration of: Y₂O₃, Eu₂O₃, Gd₂O₃, Tb₂O₃, Dy₂O₃, Ho₂O₃, Er₂O₃, Tm₂O₃, Yb₂O₃ and Lu₂O₃.
- 3) TREO (Total Rare Earth Oxides) is HREO plus: La₂O₃, Ce₂O₃, Pr₂O₃, Nd₂O₃ and Sm₂O₃.
- 4) Mineral Resources are estimated using price forecasts for 2014 for rare metals prepared early in 2010 for the PFS. Rare earths were valued at an average net price of US\$21.94/kg, ZrO₂ at US\$3.77/kg, Nb₂O₅ at US\$45/kg, and Ta₂O₅ at US\$130/kg.
- 5) A cut-off NMR value of C\$260 per tonne, equal to the PFS average operating cost, was used. NMR is defined as "Net Metal Return" or the in situ value of all the payable rare metals in the ore, net of estimated metallurgical recoveries and off-site processing costs.
- 6) An exchange rate of 1.11 was used.
- 7) ZrO₂ refers to Zirconium Oxide, Nb₂O₅ refers to Niobium Oxide, Ta₂O₅ refers to Tantalum Oxide, Ga₂O₃ refers to Gallium Oxide.
- 8) Mineral Resources are inclusive of Mineral Reserves.

TABLE 14-12 INFERRED MINERAL RESOURCES
Avalon Rare Metals Inc. – Thor Lake Project

Zone	NMR Cut-Off Value	Tonnes (millions)	TREO (%)	HREO (%)	ZrO ₂ (%)	Nb ₂ O ₅ (%)	Ta ₂ O ₅
Basal	>\$260	107.26	1.35	0.26	2.83	0.37	354
	>\$400	62.31	1.55	0.32	3.23	0.42	404
	>\$600	9.30	2.16	0.54	4.53	0.55	564
	>\$700	4.37	2.50	0.68	5.22	0.61	658
Upper	>\$260	115.98	1.27	0.12	2.37	0.34	196
	>\$400	18.96	1.71	0.16	3.21	0.46	259
	>\$600	0.93	2.48	0.24	4.62	0.65	447
	>\$700	0.07	3.48	0.29	4.88	0.69	472
Total	>\$260	223.24	1.31	0.19	2.59	0.36	272
	>\$400	81.27	1.59	0.28	3.22	0.43	370
	>\$600	10.22	2.19	0.51	4.54	0.56	553

Notes:

- 1) CIM definitions were followed for Mineral Resources.
- 2) HREO (Heavy Rare Earth Oxides) is the total concentration of: Y₂O₃, Eu₂O₃, Gd₂O₃, Tb₂O₃, Dy₂O₃, Ho₂O₃, Er₂O₃, Tm₂O₃, Yb₂O₃ and Lu₂O₃.
- 3) TREO (Total Rare Earth Oxides) is HREO plus: La₂O₃, Ce₂O₃, Pr₂O₃, Nd₂O₃ and Sm₂O₃.
- 4) Mineral Resources are estimated using price forecasts for 2014 for rare metals prepared early in 2010 for the PFS. Rare earths were valued at an average net price of US\$21.94/kg, ZrO₂ at US\$3.77/kg, Nb₂O₅ at US\$45/kg, and Ta₂O₅ at US\$130/kg.
- 5) A cut-off NMR value of C\$260 per tonne, equal to the PFS average operating cost, was used. NMR is defined as "Net Metal Return" or the in situ value of all the payable rare metals in the ore, net of estimated metallurgical recoveries and off-site processing costs.
- 6) An exchange rate of 1.11 was used.
- 7) ZrO₂ refers to Zirconium Oxide, Nb₂O₅ refers to Niobium Oxide, Ta₂O₅ refers to Tantalum Oxide, Ga₂O₃ refers to Gallium Oxide.
- 8) Mineral Resources are inclusive of Mineral Reserves.

TABLE 14-13 MINERAL RESOURCE – OXIDE GRADE FOR VARIOUS CUT-OFF VALUES
Avalon Rare Metals Inc. – Thor Lake Project

zone	zone	new code	SCan cutoff	MINE	% TREO	% HREO	% H-T	ppm ZRO2	ppm NB2O5	ppm GA2O3	ppm TA2O5	ppm Y2O3	ppm LA2O3	ppm CE2O3	ppm PR2O3	ppm ND2O3	ppm SM2O3	ppm EU2O3	ppm GD2O3	ppm TB2O3	ppm DY2O3	ppm HO2O3	ppm ER2O3	ppm TM2O3	ppm YB2O3	ppm LU2O3	ppm HFO2	ppm THO2	DEN	
west long lake	basal	indicated	>=	260	8,658,615	1.39	0.30	20.73	29,726	3,718	108	391	1,546	2,242	4,980	632	2,486	555	70	496	75	376	65	172	22	130	19	603	122	2.84
westlong lake	basal	indicated	>=	260	7,278,190	1.47	0.33	21.34	30,097	3,791	109	394	1,716	2,353	5,234	661	2,603	579	73	517	81	411	73	191	25	148	21	606	124	2.86
tardiff lake	basal	indicated	>=	260	22,091,727	1.58	0.32	20.13	29,407	4,137	142	399	1,743	2,561	5,921	717	2,812	592	73	532	78	387	67	169	22	130	18	576	161	2.90
tardiff lake	basal	indicated	>=	260	19,457,557	1.64	0.35	21.16	30,448	4,120	145	396	1,883	2,633	5,982	744	2,919	628	78	572	86	429	75	193	25	149	21	605	147	2.89
	basal	indicated	>=	260 Total	57,486,089	1.56	0.33	20.72	29,895	4,024	133	396	1,757	2,511	5,713	706	2,773	597	74	538	81	403	70	180	23	139	19	594	146	2.88
west long lake	basal	indicated	>=	400	5,125,325	1.66	0.38	23.01	35,162	4,299	103	465	2,030	2,609	5,796	738	2,915	662	85	601	95	489	87	230	30	174	25	714	130	2.87
westlong lake	basal	indicated	>=	400	4,627,653	1.73	0.41	23.48	35,056	4,328	104	461	2,196	2,700	6,008	761	3,009	679	87	617	99	522	95	250	33	193	27	707	130	2.89
tardiff lake	basal	indicated	>=	400	15,377,003	1.78	0.38	21.46	33,315	4,548	147	448	2,057	2,849	6,501	801	3,147	670	84	613	93	467	81	207	27	161	22	668	171	2.91
tardiff lake	basal	indicated	>=	400	14,664,764	1.82	0.40	22.15	34,157	4,480	147	438	2,157	2,880	6,524	817	3,212	697	88	640	97	494	87	225	30	176	24	679	154	2.91
	basal	indicated	>=	400 Total	39,794,745	1.77	0.39	22.15	34,066	4,465	136	448	2,107	2,812	6,362	794	3,125	680	86	622	95	486	86	222	29	172	24	682	155	2.90
west long lake	basal	indicated	>=	600	1,802,915	2.02	0.53	26.55	42,688	4,999	95	572	2,868	3,034	6,770	866	3,425	793	104	739	124	679	126	342	45	263	38	871	136	2.91
westlong lake	basal	indicated	>=	600	1,779,966	2.13	0.58	27.45	42,826	5,098	99	576	3,168	3,161	7,061	898	3,566	824	108	777	133	739	140	378	50	294	41	868	129	2.95
tardiff lake	basal	indicated	>=	600	5,873,639	2.21	0.53	24.33	41,350	5,292	145	532	2,876	3,396	7,716	967	3,824	841	108	788	125	659	119	311	42	245	34	827	174	2.95
tardiff lake	basal	indicated	>=	600	5,209,959	2.25	0.52	23.48	42,814	5,491	147	559	2,851	3,496	8,020	986	3,905	847	108	786	124	648	116	300	40	236	33	858	189	2.95
	basal	indicated	>=	600 Total	14,666,479	2.19	0.54	24.68	42,214	5,303	134	552	2,902	3,359	7,628	953	3,773	835	107	780	125	667	121	319	43	250	35	849	169	2.94
west long lake	basal	indicated	>=	700	899,453	2.23	0.59	26.41	47,705	5,488	99	653	3,183	3,360	7,504	951	3,762	871	115	799	135	747	140	388	50	292	42	985	158	2.92
westlong lake	basal	indicated	>=	700	1,083,367	2.31	0.65	28.00	46,215	5,451	103	632	3,520	3,394	7,592	960	3,819	885	117	835	145	816	156	427	57	329	46	946	135	2.97
tardiff lake	basal	indicated	>=	700	2,844,159	2.46	0.62	25.57	45,238	5,783	143	594	3,381	3,705	8,464	1,058	4,202	930	119	882	143	772	142	372	50	288	39	915	192	2.97
tardiff lake	basal	indicated	>=	700	2,428,964	2.53	0.63	25.36	47,224	6,029	144	636	3,475	3,813	8,827	1,077	4,292	945	123	894	146	787	144	373	50	290	39	965	204	2.97
	basal	indicated	>=	700 Total	7,255,943	2.43	0.62	25.97	46,354	5,779	132	621	3,409	3,652	8,337	1,036	4,120	921	120	869	143	781	144	383	51	295	41	945	183	2.96
west long lake	upper	indicated	>=	260	3,821,843	1.39	0.13	9.47	21,139	2,727	158	184	560	2,579	5,861	730	2,844	550	59	370	39	146	20	48	6	36	5	369	128	2.80
westlong lake	upper	indicated	>=	260	3,194,754	1.42	0.14	9.83	21,713	2,743	160	189	597	2,640	5,984	749	2,931	568	61	393	42	155	21	51	6	38	5	380	131	2.82
tardiff lake	upper	indicated	>=	260	11,915,415	1.48	0.14	10.01	20,846	3,191	177	191	643	2,814	6,382	762	2,937	528	56	396	42	152	22	53	6	39	6	364	137	2.82
tardiff lake	upper	indicated	>=	260	11,710,025	1.52	0.16	10.88	20,935	3,131	177	197	730	2,839	6,433	783	3,012	562	60	425	47	175	25	62	7	45	6	378	144	2.82
	upper	indicated	>=	260 Total	30,642,037	1.48	0.15	10.26	21,007	3,064	173	192	661	2,776	6,295	765	2,953	547	59	404	43	160	23	56	6	41	6	372	138	2.82
westlong lake	upper	indicated	>=	400	542,455	1.92	0.19	10.09	30,669	3,513	158	243	838	3,540	8,005	998	3,965	772	84	528	57	216	30	70	8	53	7	508	167	2.86
west long lake	upper	indicated	>=	400	452,984	1.94	0.18	9.34	30,620	3,540	159	234	793	3,593	8,191	1,020	3,989	771	82	506	54	202	28	66	8	48	7	498	163	2.85
tardiff lake	upper	indicated	>=	400	2,898,941	2.21	0.23	11.08	29,693	4,014	184	249	1,056	4,210	9,276	1,127	4,367	798	85	599	66	253	37	91	10	68	10	518	196	2.88
tardiff lake	upper	indicated	>=	400	2,351,291	2.32	0.21	9.79	28,850	4,072	189	237	943	4,620	9,905	1,175	4,608	795	83	600	63	229	33	81	9	59	8	500	199	2.88
	upper	indicated	>=	400 Total	6,245,671	2.20	0.21	10.38	29,527	3,958	181	243	975	4,261	9,324	1,126	4,395	793	84	587	63	237	34	84	9	62	9	509	192	2.87
west long lake	upper	indicated	>=	600	16,922	2.48	0.28	11.15	46,260	4,842	81	324	1,261	4,497	10,306	1,276	4,988	984	106	727	79	290	44	113	13	81	11	653	145	2.84
westlong lake	upper	indicated	>=	600	21,484	2.56	0.26	10.13	45,761	4,739	140	332	1,120	4,673	10,705	1,317	5,244	1,039	110	724	81	292	41	100	11	70	9	687	204	2.91
tardiff lake	upper	indicated	>=	600	314,443	4.00	0.35	10.13	39,346	5,268	214	304	1,564	8,605	16,707	1,926	7,928	1,293	134	977	108	412	59	138	15	96	14	661	332	2.91
tardiff lake	upper	indicated	>=	600	255,789	4.96	0.38	8.48	36,857	4,825	243	259	1,577	11,400	20,551	2,314	10,046	1,490	151	1,171	125	449	63	144	13	82	11	611	431	2.95
	upper	indicated	>=	600 Total	608,638	4.31	0.36	9.47	38,718	5,051	220	286	1,546	9,527	17,933	2,050	8,642	1,358	139	1,043	113	420	60	138	14	89	12	640	364	2.92
westlong lake	upper	indicated	>=	700	1,425	2.55	0.30	11.76	54,747	5,607	20	373	1,397	4,513	10,438	1,308	5,200	1,053	115	807	89	320	50	131	15	89	11	738	176	2.85
tardiff lake	upper	indicated	>=	700	127,019	5.64	0.44	9.00	42,128	5,494	246	296	1,869	13,268	23,223	2,559	11,232	1,670	171	1,306	146	543	76	167	16	97	14	692	482	2.96
tardiff lake	upper	indicated	>=	700	139,238	6.58	0.46	7.18	36,577	4,884	276	227	1,838	16,031	27,058	2,952	13,362	1,825	182	1,485	158	562	77	172	14	81	11	580	567	2.96
	upper	indicated	>=	700 Total	267,682	6.11	0.45	8.06	39,308	5,177	261	260	1,850	14,658	25,150	2,757	12,308	1,747	176	1,396	152	552	76	170	15	89	12	634	524	2.96

zone	zone	new code	\$Can cutoff	MINE	% TREO	% HREO	% H-T	ppm ZRO2	ppm NB2O5	ppm GA2O3	ppm TA2O5	ppm Y2O3	ppm LA2O3	ppm CE2O3	ppm PR2O3	ppm ND2O3	ppm SM2O3	ppm EU2O3	ppm GD2O3	ppm TB2O3	ppm DY2O3	ppm HO2O3	ppm ER2O3	ppm TM2O3	ppm YB2O3	ppm LU2O3	ppm HFO2	ppm THO2	DEN
westlong lake	basal	inferred	≥ 260	8,980,371	1.17	0.21	17.12	27,127	3,327	119	347	1,036	1,993	4,413	559	2,186	479	59	409	56	259	43	112	14	86	12	557	117	2.85
thor lake	basal	inferred	≥ 260	63,313,676	1.27	0.24	18.76	27,309	3,574	123	333	1,228	2,080	4,747	603	2,390	487	60	443	62	296	50	119	17	97	14	536	164	2.84
thor lake	basal	inferred	≥ 260	14,522,170	1.41	0.27	18.97	29,676	3,974	127	358	1,395	2,310	5,310	670	2,626	524	64	475	68	330	58	134	19	108	15	575	179	2.86
thor lake	basal	inferred	≥ 260	1,432,992	1.43	0.27	18.63	30,028	4,038	124	362	1,405	2,337	5,471	677	2,648	524	64	474	67	327	57	133	19	108	15	569	177	2.86
tardiff lake	basal	inferred	≥ 260	19,337,544	1.66	0.36	20.54	30,752	4,198	142	423	1,936	2,676	6,091	747	2,916	626	79	557	86	438	77	194	26	151	21	612	158	2.92
	basal	inferred	≥ 260 Total	107,586,753	1.35	0.26	18.97	28,268	3,726	126	354	1,364	2,214	5,046	635	2,503	516	64	465	67	323	56	134	18	107	15	557	161	2.85
thor lake	basal	inferred	≥ 400	34,729,809	1.41	0.28	20.03	30,812	4,020	127	368	1,463	2,274	5,196	668	2,629	534	67	492	71	349	61	144	20	117	17	604	180	2.86
westlong lake	basal	inferred	≥ 400	3,728,687	1.49	0.31	20.84	31,801	3,947	108	426	1,608	2,417	5,367	684	2,692	605	77	537	80	395	68	176	22	131	19	654	134	2.85
thor lake	basal	inferred	≥ 400	9,455,140	1.63	0.32	20.06	33,891	4,515	129	412	1,684	2,630	6,035	767	3,009	609	76	559	81	399	70	165	24	135	19	672	191	2.87
thor lake	basal	inferred	≥ 400	958,999	1.68	0.33	19.72	34,578	4,611	128	419	1,712	2,712	6,291	791	3,097	624	77	572	82	405	72	168	24	139	20	682	192	2.88
tardiff lake	basal	inferred	≥ 400	13,439,142	1.88	0.44	22.66	34,801	4,667	149	485	2,369	2,957	6,694	828	3,238	710	92	648	104	543	97	247	33	193	27	711	165	2.94
	basal	inferred	≥ 400 Total	62,311,777	1.55	0.32	20.65	32,257	4,240	131	404	1,704	2,491	5,674	720	2,829	589	74	540	80	402	71	171	24	137	19	642	176	2.88
thor lake	basal	inferred	≥ 600	1,078,534	1.83	0.36	19.56	41,934	5,329	120	487	1,810	2,844	6,930	844	3,368	703	87	636	89	436	79	190	29	173	26	859	139	2.91
thor lake	basal	inferred	≥ 600	2,340,784	1.90	0.46	24.72	40,578	5,070	113	485	2,407	2,807	6,628	844	3,400	740	96	735	114	586	109	266	39	227	33	813	156	2.93
westlong lake	basal	inferred	≥ 600	541,211	1.96	0.50	25.48	39,120	4,670	98	534	2,675	2,970	6,677	844	3,340	776	102	712	119	632	115	309	40	237	33	810	141	2.88
thor lake	basal	inferred	≥ 600	546,074	2.00	0.47	23.96	39,899	5,112	111	490	2,456	2,981	7,076	895	3,563	769	99	759	117	597	111	269	40	231	34	811	164	2.93
tardiff lake	basal	inferred	≥ 600	4,789,471	2.41	0.63	25.96	49,719	5,892	157	632	3,524	3,648	8,249	1,014	3,947	904	122	831	146	799	145	368	49	288	40	976	160	3.01
	basal	inferred	≥ 600 Total	9,296,074	2.16	0.54	24.76	45,320	5,503	135	564	2,932	3,264	7,527	935	3,684	824	109	773	128	682	125	312	43	253	36	902	156	2.97
thor lake	basal	inferred	≥ 700	576,191	2.15	0.52	24.58	45,792	5,778	110	565	2,701	3,131	7,668	935	3,770	826	107	817	126	655	123	308	46	274	40	970	144	2.90
westlong lake	basal	inferred	≥ 700	142,158	2.24	0.58	26.10	46,267	5,356	86	632	3,134	3,373	7,548	953	3,772	874	115	803	134	741	138	384	50	293	42	950	161	2.91
thor lake	basal	inferred	≥ 700	186,277	2.27	0.56	24.66	42,438	5,470	102	535	2,905	3,305	8,021	998	3,920	860	112	862	136	702	135	333	49	292	43	898	143	2.90
thor lake	basal	inferred	≥ 700	45,123	2.43	0.59	24.33	41,445	5,568	100	540	3,100	3,554	8,706	1,075	4,163	907	118	912	145	742	144	356	52	314	46	895	148	2.89
tardiff lake	basal	inferred	≥ 700	3,418,191	2.58	0.72	27.72	54,212	6,216	163	683	4,014	3,854	8,608	1,065	4,123	971	134	892	164	912	167	426	57	336	47	1,063	143	3.03
	basal	inferred	≥ 700 Total	4,367,940	2.50	0.68	27.09	52,209	6,092	150	658	3,755	3,717	8,425	1,041	4,057	943	128	878	157	862	159	404	55	324	46	1,038	143	3.00
thor lake	upper	inferred	≥ 260	77,558,886	1.23	0.12	9.73	25,370	3,575	172	205	532	2,175	5,280	656	2,583	465	52	339	32	121	17	38	6	41	6	470	126	2.87
thor lake	upper	inferred	≥ 260	1,624,268	1.31	0.13	9.66	25,401	3,751	127	210	571	2,326	5,748	669	2,633	464	50	344	34	134	20	48	7	45	7	443	134	2.87
thor lake	upper	inferred	≥ 260	2,471,846	1.31	0.12	9.47	26,215	3,859	139	216	569	2,354	5,769	673	2,633	456	50	338	33	131	20	46	7	44	7	447	134	2.87
westlong lake	upper	inferred	≥ 260	5,673,821	1.34	0.12	9.44	19,529	2,567	163	170	543	2,468	5,667	708	2,762	534	57	353	37	141	19	44	5	35	5	338	124	2.80
tardiff lake	upper	inferred	≥ 260	28,658,420	1.34	0.12	9.19	19,606	3,191	188	175	553	2,598	5,747	710	2,668	478	51	338	36	129	18	42	5	32	5	351	137	2.82
	upper	inferred	≥ 260 Total	115,987,241	1.27	0.12	9.57	23,679	3,439	174	196	539	2,300	5,432	672	2,615	471	52	340	33	124	17	40	6	39	6	433	129	2.85
thor lake	upper	inferred	≥ 400	15,554,988	1.69	0.16	9.24	32,469	4,596	179	259	692	2,916	7,320	901	3,547	650	72	468	42	153	21	46	8	52	8	611	176	2.90
thor lake	upper	inferred	≥ 400	79,543	1.70	0.16	9.36	35,880	5,182	140	293	719	2,958	7,576	860	3,390	606	66	448	42	166	25	59	9	60	9	648	169	2.91
thor lake	upper	inferred	≥ 400	1,133,487	1.78	0.18	10.06	32,677	4,960	121	284	787	3,098	7,918	892	3,518	639	70	479	48	193	30	74	11	70	10	619	175	2.90
tardiff lake	upper	inferred	≥ 400	2,087,077	1.79	0.17	10.25	28,905	4,136	181	246	816	3,377	7,540	927	3,611	652	68	456	48	185	27	67	9	54	8	522	158	2.93
westlong lake	upper	inferred	≥ 400	100,805	1.82	0.18	9.90	28,635	3,275	84	208	808	3,319	7,639	960	3,731	714	76	502	53	191	28	68	8	49	7	443	142	2.84
	upper	inferred	≥ 400 Total	18,955,900	1.71	0.16	9.40	32,083	4,563	175	259	712	2,980	7,383	903	3,553	650	72	468	43	159	22	50	8	53	8	601	174	2.91
thor lake	upper	inferred	≥ 600	727,215	2.36	0.24	10.07	46,881	6,608	147	455	1,139	4,015	10,504	1,189	4,621	852	92	595	55	220	35	89	15	101	16	1,070	200	2.95
thor lake	upper	inferred	≥ 600	108,702	2.65	0.25	9.58	43,888	6,397	104	443	1,125	4,562	12,053	1,320	5,097	964	104	689	66	262	40	101	16	117	18	1,064	217	3.15
thor lake	upper	inferred	≥ 600	59,493	2.82	0.25	8.91	46,258	7,175	116	465	1,072	4,873	12,886	1,413	5,486	1,018	108	722	66	246	36	91	15	109	17	1,097	251	3.16
tardiff lake	upper	inferred	≥ 600	32,891	4.04	0.29	7.60	38,912	4,554	234	256	1,175	8,862	17,273	2,011	8,149	1,195	120	973	91	308	44	117	11	69	10	620	301	2.93
	upper	inferred	≥ 600 Total	928,301	2.48	0.24	9.85	46,208	6,546	143	447	1,134	4,306	11,077	1,248	4,857	888	95	627	58	230	36	92	15	102	16	1,055	209	2.99
thor lake	upper	inferred	≥ 700	23,518	3.10	0.28	9.02	48,291	6,838	100	499	1,264	5,328	14,392	1,535	5,814	1,098	117	769	73	284	41	100	16	114	18	1,203	246	3.17
thor lake	upper	inferred	≥ 700	3,907	3.10	0.24	7.82	58,016	8,065	198	515	926	5,322	14,093	1,623	6,300	1,208	131	804	64	234	33	75	14	101	17	1,408	267	3.01
thor lake	upper	inferred	≥ 700	28,903	3.14	0.28	8.99	51,640	7,721	115	541	1,255	5,389	14,506	1,563	5,966	1,118	119	780	72	274	39	98	16	120	19	1,292	262	3.26
tardiff lake	upper	inferred	≥ 700	11,879	5.20	0.36	7.06	39,768	4,752	264	238	1,431	12,339	21,488	2,402	10,661	1,468	147	1,219	119	411	58	140	12	71	10	612	417	2.90
	upper	inferred	≥ 700 Total	68,207	3.48	0.29	8.60	48,78																					

CONCLUSION

Avalon validated the database, interpreted the geology, populated the block model with rare earth and rare metals oxides, and classified the resource blocks within the Nechalacho deposit of the Thor Lake project. RPA has reviewed the techniques and methodology used to create and populate this block model and is satisfied that the database is valid and the interpolation and search strategies are appropriate, reasonable, and meet current industry standards.

The current resource estimate has been reported using a Net Metal Return (NMR) cut-off value of C\$260/tonne.

COMPARISON WITH PREVIOUS MINERAL RESOURCE ESTIMATE

The current mineral resource estimate is compared with the July 19, 2010 resource estimate in the Table 14-14.

TABLE 14-14 MINERAL RESOURCE COMPARISON - 2010 TO 2011
Avalon Rare Metals Inc. – Thor Lake Project

Year	Resource	Tonnes (millions)	% TREO	% HREO	% ZrO ₂	% Nb ₂ O ₅	% Ta ₂ O ₅
2010	Basal Indicated	14.48	1.82	0.40	3.38	0.44	0.04
	Basal Inferred	76.87	1.60	0.33	3.32	0.44	0.04
	Upper Indicated	6.89	1.45	0.17	1.86	0.29	0.02
	Upper Inferred	99.06	1.29	0.12	2.44	0.36	0.02
2011	Basal Indicated	57.49	1.56	0.33	2.99	0.40	0.04
	Basal Inferred	107.59	1.35	0.26	2.83	0.37	0.04
	Upper Indicated	30.64	1.48	0.15	2.10	0.31	0.02
	Upper Inferred	115.98	1.27	0.12	2.37	0.34	0.02

The mineral resource tonnage increased from 2010 to 2011 by addition of new drilling. The grades of the current estimate are slightly lower than the July 2010 estimate. The grade differences are due to using different interpolation methods and search strategy; particularly, for the 2011 estimate the data was not unfolded prior to interpolation and the composite selection was adjusted with respect to the 2010 estimate.

15 MINERAL RESERVE ESTIMATE

SUMMARY

Mineral Reserves consist of a portion of the Indicated Resources within a mine design by Avalon, with dilution and recovery factors applied. Minor amounts of Mineral Resources from the Upper Zone beyond the Basal Zone were included in the estimation of the Mineral Reserves; these are generally in areas where the tops of the stope extend past the soft boundary between the Upper Zone and the Basal Zone.

TABLE 15-1 MINERAL RESERVE SUMMARY – JULY 7, 2011
Avalon Rare Metals Inc. – Thor Lake Project

	Tonnes (millions)	% TREO	% HREO	% ZrO₂	% Nb₂O₅	% Ta₂O₅
Probable Reserves	14.54	1.53	0.40	2.90	0.38	0.040

Notes:

1. CIM definitions were followed for Mineral Reserves.
2. Mineral Reserves are estimated using price forecasts for 2015 for rare earth oxides (US\$46.31/kg average), zirconium oxide (US\$3.77/kg), tantalum oxide (US\$255.63/kg) and niobium oxide (US\$55.86/kg).
3. HREO grade is the total of Y₂O₃, Eu₂O₃, Gd₂O₃, Tb₂O₃, Dy₂O₃, Ho₂O₃, Er₂O₃, Tm₂O₃, Yb₂O₃ and Lu₂O₃ grades. TREO grade comprises HREO plus La₂O₃, Ce₂O₃, Nd₂O₃, Pr₂O₃, and Sm₂O₃ grades.
4. An exchange rate of C\$0.95/US\$1.00 was used.
5. Mineral Reserves are estimated using a Net Metal Return (NMR) cut-off value of C\$300/t.
6. A minimum mining width of five metres was used.
7. Totals may differ from sum or weighted sum of numbers due to rounding.

CUT-OFF GRADE

There are a number of payable products from the Thor Lake Project, including the TREO product and concentrates containing niobium, tantalum and zirconium. The cut-off grade for the design of the stopes was therefore based upon an NMR per tonne. The NMR per tonne was based upon the estimated prices for the products after allowance for recovery at the flotation plant and the hydrometallurgical plant, and allowing for payable percentages of the products. The cut-off value is reached when NMR equals operating costs. The recoveries estimated for the flotation plant and for the hydrometallurgical plant are listed in Table 15-2.

The 3% NSR previously attached to the deposit in two royalty agreements are assumed to have been purchased by Avalon and are therefore not included in the Mineral Reserve estimate parameters.

TABLE 15-2 RECOVERY ASSUMPTIONS
Avalon Rare Metals Inc. – Thor Lake Project

	Feed to Concentrate	Concentrate to Product	Net Recovery
ZrO ₂	89.7%	90.0%	80.7%
TREO	79.5%	93.0%	73.9%
HREO	79.5%	93.0%	73.9%
Nb ₂ O ₅	68.9%	80.0%	55.1%
Ta ₂ O ₅	63.0%	50.0%	31.5%

An allowance of 0.03% of the product weight was deducted as losses in transit in consideration of the number of times that the products will be handled between the concentrator and the final customer.

The prices used for the cut off grade analysis are listed in Table 15-3 and the operating costs are based on the LOM average operating cost estimate, shown in Table 15-4. An exchange rate of USD = 0.95 CAD was used in the analysis. Details related to the metal price and operating costs are included in Sections 19 and 21 of this report.

TABLE 15-3 PRODUCT PRICES FOR CUT-OFF GRADE
Avalon Rare Metals Inc. – Thor Lake Project

	US\$/kg
TREO (average)	46.31
Nb ₂ O ₅	55.86
Ta ₂ O ₅	255.63
ZrO ₂	3.77

TABLE 15-4 LOM OPERATING COST ESTIMATE
Avalon Rare Metals Inc. – Thor Lake Project

	Life of Mine
	C\$/t milled
Thor Lake	
Mining	38.54
Processing	26.51
Surface Services	6.54
Administration	11.49
Power	29.91
Summer Freight	10.73
Pine Point	
Processing	130.31
Surface Services	1.76
Administration	1.99
Sales & Marketing	11.28
Total Operating Costs	269.07

The minimum NMR value for material to be included within the Mineral Reserve estimate is therefore C\$269.

Stope planning and production scheduling was undertaken before the metal price assumptions were finalized. The production rate was selected for market reasons – a limit on the amounts of rare earths produced per year – but the orebody would support higher rates. A target of a 20-year mine life at 2,000 tpd, with ore above C\$300 NMR value, was used in developing the mine design. RPA's checks revealed that all of the stopes included in the Mineral Reserve estimate have a value in excess of the cut-off grade.

RPA notes that there is potential for the conversion of additional Indicated Mineral Resources to Mineral Reserves if stoping and development plans were prepared for this material, both within the Basal Zone, and above, in the Upper Zone.

EXTRACTION AND DILUTION

The deposit is a relatively flat-lying deposit with a number of significant undulations in the footwall topography. The deposit is planned to be mined with a combination of cut and fill stopes and long hole stopes with backfill. The minimum thickness used in the development of the Mineral Reserve estimate was 5 m.

Stopes were laid out in a primary and secondary stope configuration with paste fill planned for the stopes to provide the maximum extraction of the resource. The highest grades in the Basal Zone are generally found immediately above the footwall contact.

There is planned dilution within the stope outlines which was incurred at the edges of the stopes where lower grade material was included to provide a proper stope shape. The planned dilution grades were based upon the grades within the resource model for the areas extracted.

Unplanned dilution will be incurred mainly from the small failures that are expected to occur at the stope edges and have not been included in the Mineral Reserve estimate. Secondary stopes were designed with a 1 m skin of ore left on each wall to minimize dilution from backfill. This skin is assumed to be lost in the mining plan but in fact some portion of the skin will be recovered in the mining process.

Extraction within the stopes was assumed to be 100%.

The stoping plan was laid out to maximize the feed grade in the initial years of production. The mining plan is described in more detail in section 16.

COMPARISON TO 2010 MINERAL RESERVE ESTIMATE

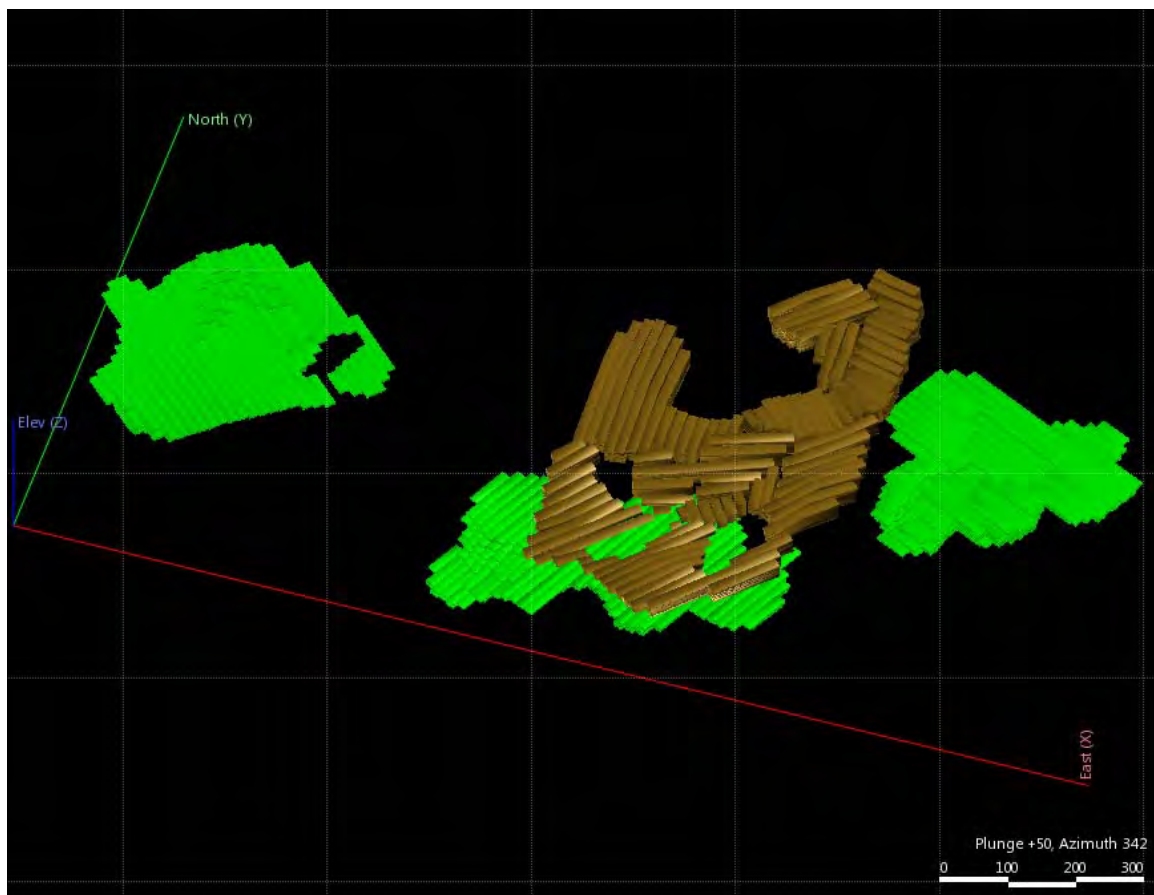
The 2011 Mineral Reserve estimate prepared by RPA (then Scott Wilson RPA) comprised material mainly from the Basal Zone. The focus in the 2010 estimate was to maximize material from the Basal Zone due to its higher grade and higher relative content of the “heavy” REOs. The 2010 estimate was confined to a single stoping area limited by the then current Indicated Resources. Indicated Resources have been expanded by drilling since the 2010 PFS.

TABLE 15-5 PROBABLE MINERAL RESERVE COMPARISON
Avalon Rare Metals Inc. – Thor Lake Project

	Tonnes (millions)	% TREO	% HREO	% ZrO ₂	% Nb ₂ O ₅	% Ta ₂ O ₅
2011	14.54	1.53	0.40	2.90	0.38	0.040
2010	12.01	1.70	0.38	3.16	0.41	0.041

RPA notes that although the tonnage and grade of the Mineral Reserves has undergone only modest changes, the area mined is quite different. The areas of the 2010 and 2011 Mineral Reserve estimates are shown in Figure 15-1 with the 2011 areas shaded in green and the 2010 areas shaded in brown.

FIGURE 15-1 2010 AND 2011 MINERAL RESERVE AREAS



MINERAL RESERVE ESTIMATE – INDIVIDUAL REOS

The Mineral Reserve estimate summarized at the start of this section is reported by individual rare earth oxide components in the table below.

TABLE 15-6 PROBABLE MINERAL RESERVES - JULY 7, 2011

Avalon Rare Metals Inc. – Thor Lake Project

	Units	Basal Zone
Tonnes	(millions)	14.54
Light Rare Earths	% LREO	1.13%
Lanthanum	ppm La ₂ O ₃	2,325
Cerium	ppm Ce ₂ O ₃	5,173
Praseodymium	ppm Pr ₆ O ₁₁	658
Neodymium	ppm Nd ₂ O ₃	2,593
Samarium	ppm Sm ₂ O ₃	590
Heavy Rare Earths	% HREO	0.40%
Yttrium	ppm Y ₂ O ₃	2,175
Europium	ppm Eu ₂ O ₃	78
Gadolinium	ppm Gd ₂ O ₃	574
Terbium	ppm Tb ₄ O ₇	95
Dysprosium	ppm Dy ₂ O ₃	508
Holmium	ppm Ho ₂ O ₃	93
Erbium	ppm Er ₂ O ₃	245
Thulium	ppm Tm ₂ O ₃	32
Ytterbium	ppm Yb ₂ O ₃	189
Lutetium	ppm Lu ₂ O ₃	26
Total Rare Earths	% TREO	1.53%
Other Elements		
Zirconium	ppm ZrO ₂	28,998
Hafnium	ppm HfO ₂	615
Niobium	ppm Nb ₂ O ₅	3,800
Tantalum	ppm Ta ₂ O ₅	404

Notes:

1. CIM definitions were followed for Mineral Reserves.
2. Mineral Reserves are estimated using price forecasts for 2015 for rare earth oxides (US\$46.31/kg average), zirconium oxide (US\$3.77/kg), tantalum oxide (US\$255.63/kg) and niobium oxide (US\$55.86/kg).
3. HREO grade is the total of Y₂O₃, Eu₂O₃, Gd₂O₃, Tb₂O₃, Dy₂O₃, Ho₂O₃, Er₂O₃, Tm₂O₃, Yb₂O₃ and Lu₂O₃ grades. TREO grade comprises HREO plus La₂O₃, Ce₂O₃, Nd₂O₃, Pr₂O₃, and Sm₂O₃ grades.
4. An exchange rate of C\$0.95/US\$1.00 was used.
5. Mineral Reserves are estimated using a Net Metal Return (NMR) cut-off value of C\$300/t.
6. A minimum mining width of five metres was used.
7. Totals may differ from sum or weighted sum of numbers due to rounding.

RPA has categorized the Mineral Reserves as Probable, as they have been converted from Indicated Mineral Resources.

RPA COMMENT

RPA is of the opinion that the Mineral Reserve estimates have been compiled in a manner consistent with the CIM Guidelines and in accordance with NI 43-101. RPA considers the mining plan to be relatively simple and the mining conditions are expected to be good. The Mineral Reserve estimates may be materially impacted if the metallurgical performance in the flotation plant and in the hydrometallurgical plant does not match that of the laboratory testing. RPA recommends that pilot scale testing of the flotation and hydrometallurgical processes be undertaken as part of the ongoing project development. The project has not obtained permits to operate as of the date of this study. An EIA report has been submitted to the Government of the NWT and while Avalon does not foresee any unusual issues, there will be public involvement in the assessment of the project and the issuance of operating permits.

16 MINING METHODS

The production plan for the Nechalacho Deposit assumes that the ore will be concentrated at Thor Lake and barged across the Great Slave Lake (GSL) to Pine Point for hydrometallurgical processing. The layout of the two sites is shown in Figures 16-1 and 16-2.

MINING OPERATIONS

Underground mining of the Indicated Resource of the Basal Zone has been chosen for the development of the Basal Zone. The mining plan and the layout of some of the mine infrastructure has been modified from the PFS design, however, the planned operation is fundamentally the same. The operation is designed on the basis of a 2,000 tpd operation with a 20 year mine life.

MINING METHOD

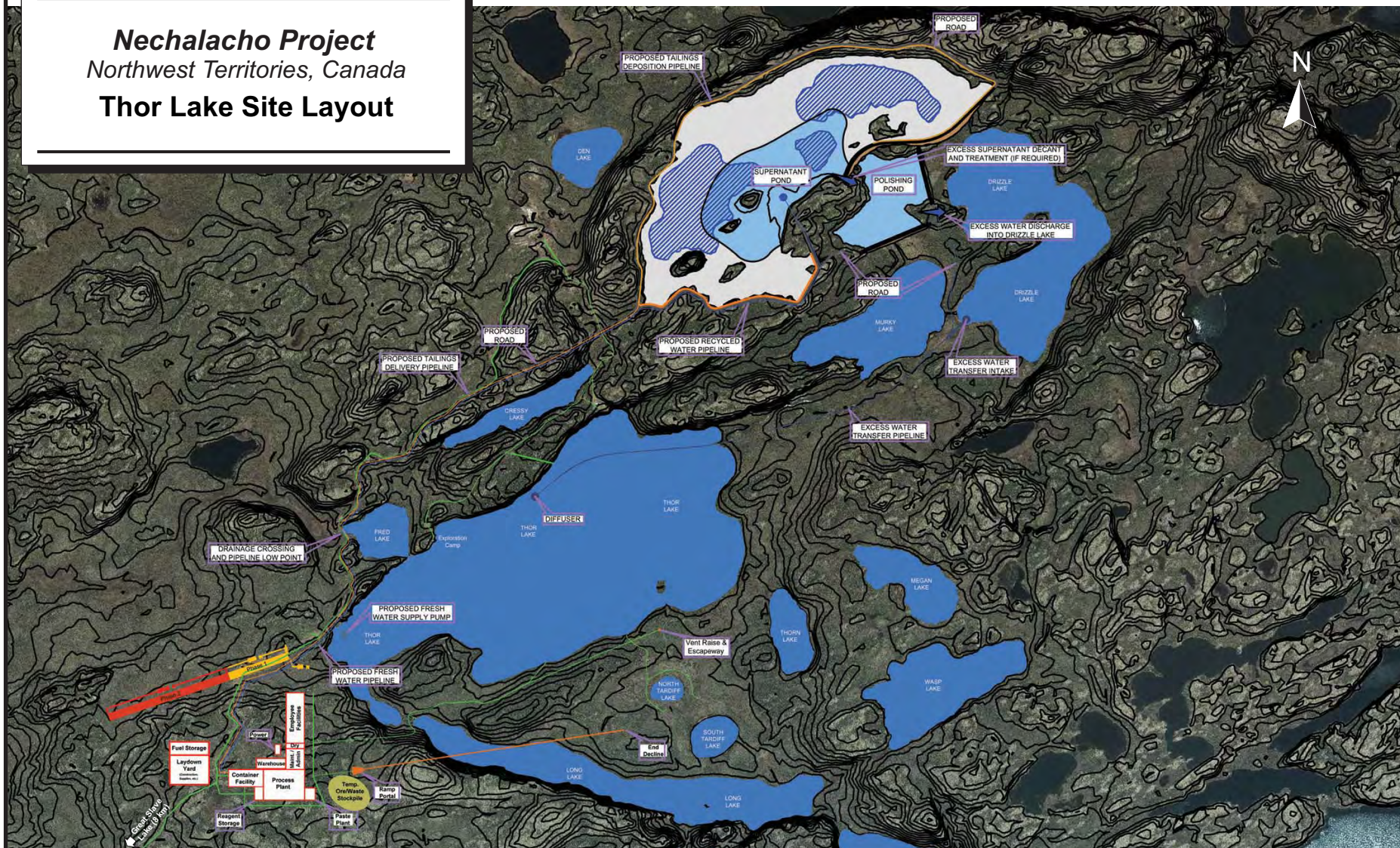
The majority of the Indicated Resource of the Thor Lake deposit lies directly beneath and to the north of Long Lake approximately 180 m below surface. The mineralization exists from near surface downwards however the highest grades are at the bottom of the deposit at the base of the Basal Zone. Open pit mining has not been considered in any detail due to the lower grades near surface and the magnitude of the surface disturbance which was unacceptable to Avalon and was considered to be a major impediment to obtaining permits.

Access to the deposit will be through a ramp collared to the west of Long Lake. Mining is planned to access the higher grade resources at the base of the deposit and to minimize the surface disturbance. Ground conditions are expected to be good and primary stopes are expected to be stable at widths of 15 m. In light of the high value of the resources in the Basal Zone and to maximize extraction, the use of paste backfill is proposed and mining will be done with a first pass of primary stopes followed by pillar extraction after the primary stopes have been filled.

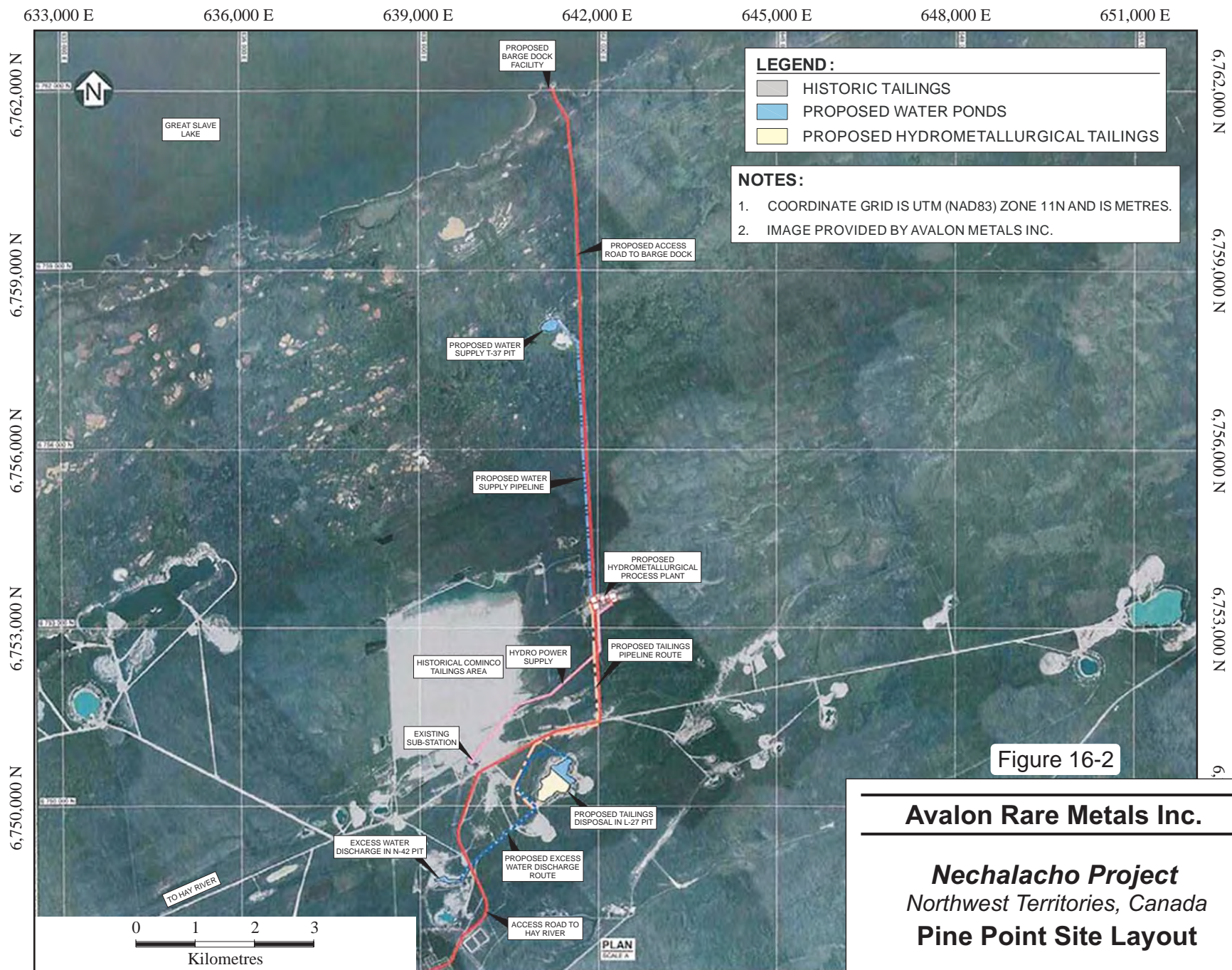
Figure 16-1

Avalon Rare Metals Inc.

Nechalacho Project
Northwest Territories, Canada
Thor Lake Site Layout



16-2



The mining will be done with rubber tired mechanized equipment to provide operating flexibility. Broken ore will be hauled and deposited in an ore pass leading to the underground crushing chamber. The underground crushing circuit will include primary, secondary and tertiary crushing and screening. From the crushing plant the -15 mm fine ore will be stored in a 1,000 t fine ore bin. From the FOB the ore will be transported to the mill on surface by a conveyor system. The conveyor will be hung from the back of the main access decline.

MINE DESIGN

The key design criteria set for the Thor Lake mine were:

- Mine and process plant capacity of 2,000 tpd (730,000 tpa)
- 669,000 tonnes in year one, 730,000 tpa thereafter
- 20 year mine life
- Production from Basal Zone
- Mechanized mining
- Underground crushing
- Conveyor haulage of ore to mill
- Paste backfill for maximum extraction

RPA recommends the use of medium-sized mechanized equipment suitable for headings of 25 m² to 30 m². Mechanized equipment will be selected to minimize the direct physical labour.

The mine plan was developed by Avalon and reviewed by RPA. The stoping plan starts in the highest grade areas of the Basal Zone and the stoping is planned in a series of primary and secondary stopes.

Whereas the PFS included material from a single area of the Basal Zone and overlying upper zone, the current plan is to mine in three areas of the Basal Zone with the stoping sequence targeting the higher grade areas first. The three production zones are shown in Figure 16-3.

The mining approach will be to mine a sequence of 15 m wide primary stopes followed by extraction of the intervening 16 m wide secondary stopes after the primary stopes are backfilled with a paste backfill. Stope cuts will be 5 m high and up to three cuts will be taken before a stope is backfilled. In the early years the stopes will be mined in a series of 5 m high slices using jumbos to drill. Later, the mining will move to longhole stoping to reduce operating costs. RPA recommends that the long hole stoping be considered in more detail as the current plan of 15 m high long hole stopes is not considered to be significantly more advantageous than continuing with five metre slices.

Stopes have been designed with flat footwalls and oriented in each of the three areas to maximize the ore extraction and minimize dilution due to the variations in the footwall of the Basal Zone. Access to the stopes will be through a system of access ramps located outside the Indicated Resource in the Basal Zone. The locations of the ramps are shown in Figure 16-4. The access ramps would connect to a centrally located ore pass and ventilation raises to surface. For each stope a short stope access will be driven to the first cut and then slashed to access subsequent cuts above or below the initial cut.

Mine ventilation will be achieved with surface fans forcing air (heated in winter) into the mine at a central intake ventilation raise and with the airflow being regulated to ventilate the east and west areas of the mine with exhaust air up the main ramp and up a ventilation raise at the eastern edge of the planned mining area.

Recovery of the secondary stopes is planned by longhole mining with a top and bottom access. To reduce dilution the primary stopes will be filled with paste fill and a one metre thick skin will be left on each stope wall. It is expected that half of the skin will break due to blasting but this loss of ore is offset by the reduction in dilution due to backfill.

GEOTECHNICAL ANALYSIS

The available geotechnical information from the TLP has been reviewed with the objective of providing preliminary stope sizing recommendations. Geotechnical information for the PFS design recommendations was based on geotechnical logging completed in conjunction with the Avalon 2009 exploration drill program. That geotechnical work remains the basis for the mine design, and is described in more detail in the 2010 technical report.

The results suggest that the rock masses encountered at the TLP are generally good quality and that there is little variation with depth. General observations include the following:

- Drill core recovery was consistently close to 100% suggesting that few zones of reduced rock mass quality were encountered.
- RQD values were generally in the 90% to 100% range.
- RMR values were generally ranged between 60 and 80 and would be typical of a GOOD quality rock mass.

The rock mass was grouped into domains with similar engineering characteristics. Given the relatively minor downhole variations in rock mass quality and the focus of this study on the rock masses in and around the ore body, it was decided to utilize only three geomechanical domains: HW, Ore and FW. A comparison of the design values determined for each domain suggested that they do not vary enough to justify different design values. As such, RMR = 67 and a Q' of 4.2 were initially selected for pre-feasibility design purposes for all domains. Lower and upper bound values were also used for certain analyses.

Subsequent review of the number of joint sets and the rationalization of the design parameters to the expected “good” rock conditions led to a revision of the Q' value to 8.3. In addition the performance of the rock as openings are developed will be used as a guide in the final stope design sizing.

During discussions with the mine design team, it was determined that rock mechanics input was required in the following areas in order to advance mine planning and mining method selection discussions.

- Room and Pillar Stopes: the span that could be opened-up between pillars
- Long Hole Open Stopes: stope dimensions

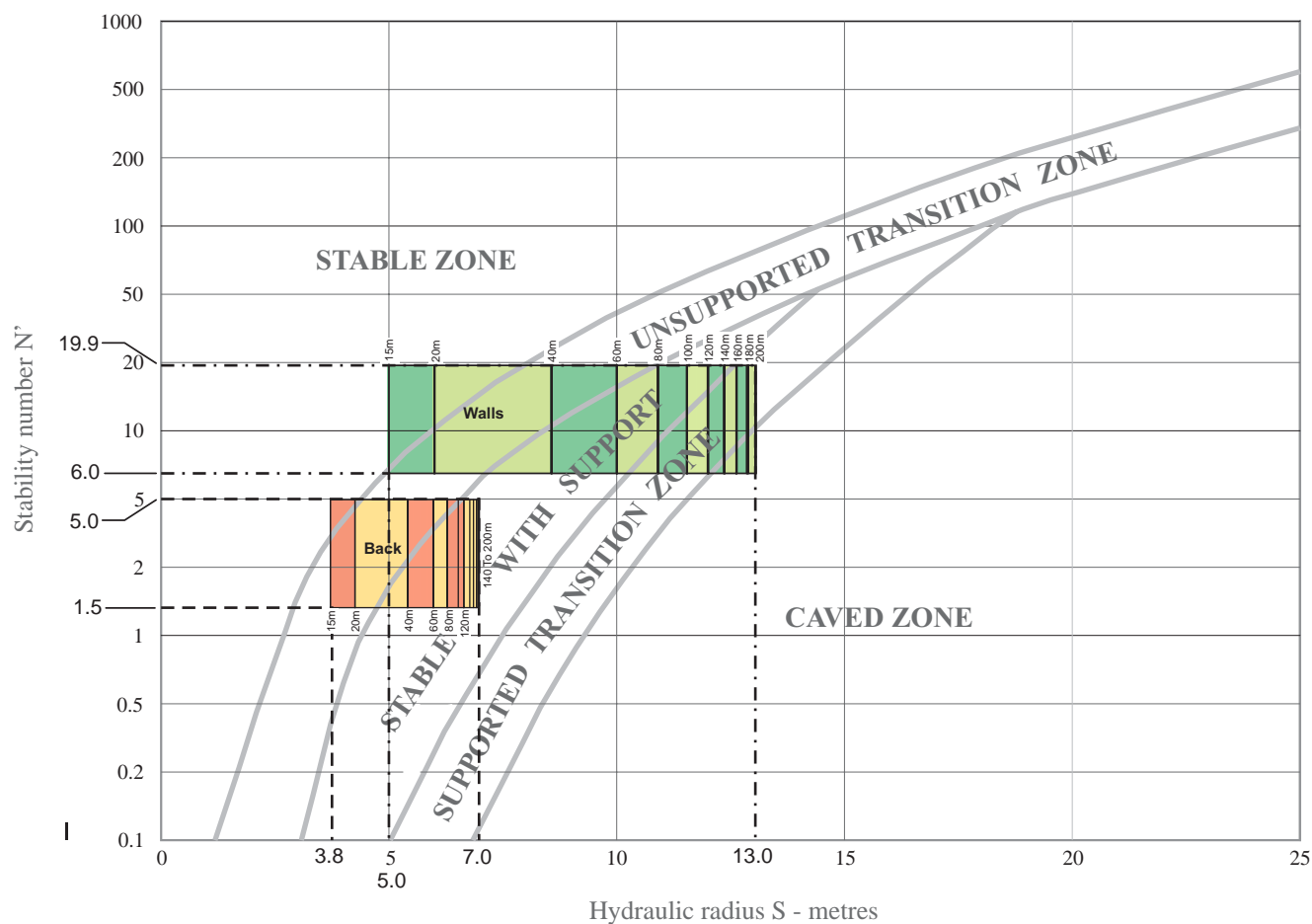
In order to estimate achievable spans for Room and Pillar mining several different approaches were adopted including empirical design, support calculations and historical experience. The results of the analyses generally suggest that 8 to 12 m spans could be achieved for temporary man-entry openings with 2.4 m rebar on a 1.2 m or 1.5 m square pattern and 6-gauge welded wire mesh. Longer support would be required in the

intersections between the rooms. This range of spans is relatively aggressive and exceeds rules-of-thumb that many operating mines utilize as the starting point for their standard support patterns. As such, these spans will likely only be achievable in the absence of adverse structure (forming wedges), stress effects, excessive blast damage and/or substantial zones of reduced rock mass quality. If these situations are encountered then an upgraded ground support package will be required.

For the purposes of determining Long Hole open stope dimensions a well accepted empirical design technique was utilized (the Stability Graph method, shown in Figure 16-3). For this project, it was decided to design within the “Unsupported Transition Zone”, but with an option to cablebolt the stope back and design within the “Stable Support Zone”. The design results for the Thor Lake project assumed that the total stope height would be 30 m (back-to-floor) and that the walls would all be vertical. The stope back was found to be the limiting stope surface and that 15 m to 25 m (square) stopes should be achievable. The 15 m to 20 m range is thought to be appropriate for preliminary planning purposes. It is likely that at least some long back support will be required to control dilution, although the length and intensity of the support will be somewhat dependent on the configuration of the over-cuts.

MAIN DECLINE

The main access ramp will be driven from a location near the mill at a grade of -15%. From surface to a location below the fine ore bin the main access will be approximately 1,800 m in length. The decline design includes one transfer point for the conveyor. The mine layout is shown in Figure 16-4. The decline will be driven as a 6.5 m high by 5 m wide to accommodate the overhead conveyor system and access to men and equipment.



STOPE NOTES:

1. STOPE ASSUMED TO BE 30M HIGH (FOR WALL CALCS) AND WITH A LENGTH INDICATED ABOVE THE COLOURED REGION.
2. STOPE ASSUMED TO BE 15M WIDE (FOR BACK CALCS) AND WITH A LENGTH INDICATED BELOW THE COLOURED REGION.
3. SIGMA3 IS ASSUMED TO BE VERTICAL.
4. k (N-S) ASSUMED TO BE 2.0 AND k (E-W) ASSUMED TO BE 1.5
5. A-FACTOR ESTIMATES TAKEN FROM VERY SIMPLE EXAMINE2D MODELS.
6. DIMENSIONS IN THE "UNSUPPORTED TRANSITION ZONE" WOULD BE SUITABLE FOR WALLS.
7. DIMENSIONS IN THE "UNSUPPORTED TRANSITION ZONE" WOULD BE SUITABLE FOR THE BACK DESIGN IN THE ABSENCE OF LONG SUPPORT.

GENERAL NOTES:

1. HYDRAULIC RADIUS, $S = \text{AREA} / \text{PERIMETER}$.
2. STABILITY NUMBER, $N' = Q' \times A \times B \times C$.
3. SUPPORT REFERS TO THE USE OF LONG SUPPORT (e.g., CABLE BOLTS).
4. STABILITY GRAPH AFTER POTVIN, 1988 AND MODIFIED BY NICKSON, 1992.
(TAKEN FROM HOEK *et. al.*, 1995 AND MODIFIED TO CORRECT Y-AXIS).

Figure 16-3

Avalon Rare Metals Inc.

Nechalacho Project
Northwest Territories, Canada
Stability Graph

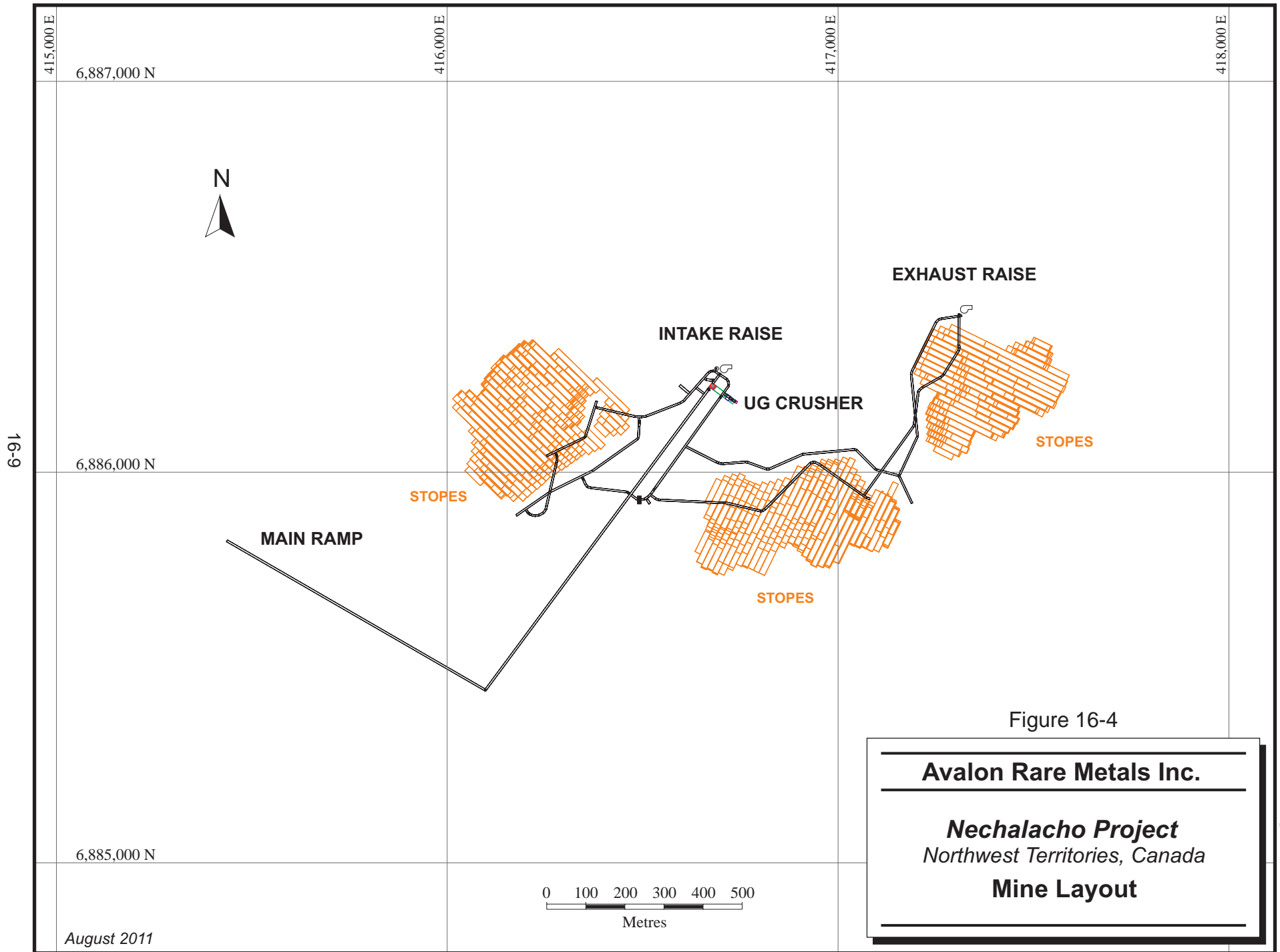


Figure 16-4

Avalon Rare Metals Inc.

Nechalacho Project
Northwest Territories, Canada

Mine Layout

The conveyor is planned to be a 76.2 cm wide conveyor belt to handle 100 tph of -15 mm crushed rock. The conveyor will have two segments with an underground transfer point. The conveyor lengths will be increased with space at the tail pulley and a take up for each belt.

RPA recommends that a vehicle bypass be designed at the transfer point so that vehicles have a corner to negotiate and do not need to navigate a hairpin turn.

The conveyor decline will continue on down to the access for the crushing and screening chambers. Excavations for lunch rooms, electrical equipment, lubricants and materials storage will also be driven in the area.

The conveyor gallery will be continued down to the excavation of a pump station and an electrical bay immediately below the conveyor feed area. Below the conveyor feed location the decline will be driven to the mine sump. The sump will be designed for the removal of sludge by LHD.

The first intersection on the main ramp is at the junction of the east and west ramps located approximately 1,400 m down the main ramp. From this junction there will be three headings, the east ramp, the west ramp and the continuation of the main decline. Shortly after the second west ramp will provide an additional heading.

The east ramp will service one mining area and each of the two west ramps will service a mining area.

UNDERGROUND LAYOUT

Stope access headings will be driven off the three access ramps shown in Figure 16-5. The ramps are required to access the three different stoping areas. In addition there will be development required to access the individual stopes. To cover a 15 m vertical cut in three lifts with a maximum 20% grade (for the stope access) these access drifts will be 75 m long for each stope. The stopes will be accessed with a ramp to the upper cut elevation and then the floor will be slashed for each lift to terminate with a 20% decline to the lowest lift.

Raise development will include the main intake ventilation raise, the exhaust raise and ore pass. Bulk development will include the crusher excavation and fine ore bin.

STOPING

Stopes will be mined in a primary and secondary sequence. Primary stopes will be 15 m wide, while the secondary stopes will be 16 m wide to leave extra space and ensure the maintenance of good ground conditions in the secondary extraction sequence. There will be a one metre skin between primary and secondary stopes to minimize backfill dilution. For mineralized zones up to 18 m high the stopes will be excavated in an overhand cut and fill sequence in one lift. Each cut will be developed using a 5 m x 5 m heading followed by the slashing of walls resulting in a 15 m x 5 m cut. Adjacent primary stopes may be developed simultaneously.

The stope development will commence at the top elevation and subsequent lifts will be taken by benching the floor using the development jumbos.

Development of secondary stopes will begin once the adjacent primary stopes have been filled. The secondary stopes will be developed with a 5 m to 6 m wide drift down the center of the stope and the remaining width will be slashed and remote mucked. In the secondary stopes a one metre thick skin will be left on each side to reduce the amount of dilution from backfill. In the course of blasting it is assumed that a portion of the skin will fail and report to the muck pile.

GRADE CONTROL

Grade control will be achieved with a combination of visual analysis and a handheld analyzer. The Nechalacho deposit Basal Zone has a distinct footwall contact which will make the bottom cut of each stope simple to follow by the miners. The grade control program will include daily face inspections and direction provided by trained geologists.

The mine geologist will complete regular examinations of the working faces, which are planned to number about 5 at any one time. While mapping the faces, the mine geologist would use a handheld XRF analyzer, and the samples for analysis would be to check the mapping completed using the handheld instrument.

Over the course of mine development there will be waste, low grade and ore grade material encountered and it will be necessary to stockpile the different materials separately as each will be handled in a separate manner in the future.

ORE AND WASTE HAULAGE

Ore will be hauled from the stope by LHD or by truck to the ore pass feeding the ROM bin located ahead of the crusher. RPA is of the opinion that the majority of the ore should be handled by trucks as the haulage distances are generally in excess of 500 m.

Until the crusher is in place and the conveyor is in service all ore will be hauled to surface using low profile haul trucks. Development waste will also be hauled to surface in the same manner through this period.

After the crusher and conveyor are in place the ore will be transported to surface by conveyor. Development waste will be either hauled to surface, crushed and conveyed to surface, or diverted to stopes for use as fill combined with the planned paste backfill.

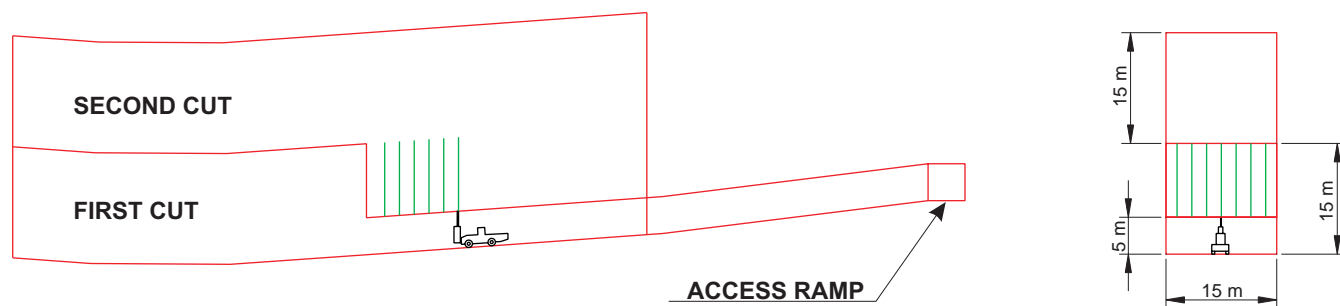


Figure 16-5 **Cut and Fill Stopping (Primary Stopes)**

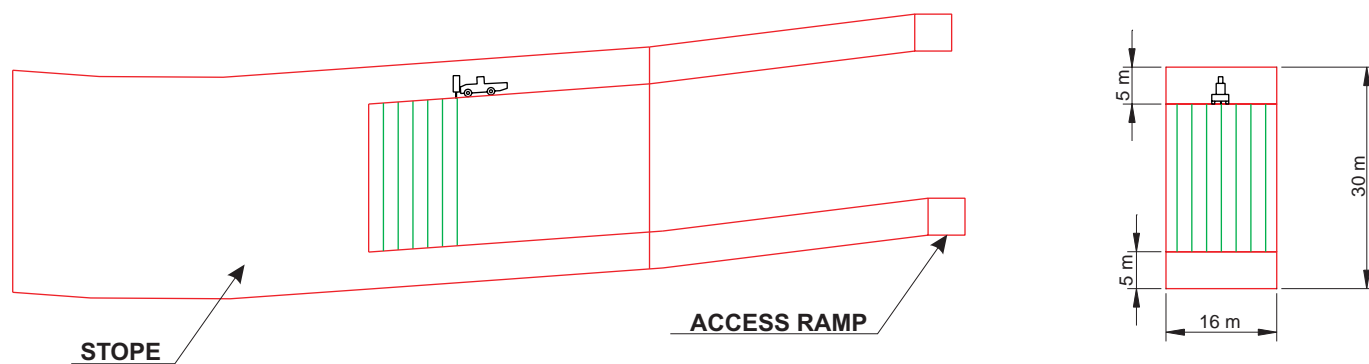


Figure 16-6 **Longhole Stopping (Secondary Stopes)**

Avalon Rare Metals Inc.

Nechalacho Project
Northwest Territories, Canada

LATERAL DEVELOPMENT

The access decline will be driven from surface as a single heading for approximately 1,400 m, thereafter, there will be multiple headings available with the ore pass access, three stope access drives and the continuation of the decline to the fine ore bin discharge location. On the stope access levels the individual stope access crosscuts will serve as muck bays during development, therefore no additional allowance for muck bays has been included.

Advance rates are 5.4 m per day on a single heading and 7.3 m/d with multiple headings, based on two shift operation. The single heading portion of the main ramp is estimated to require 260 to 290 days.

Ore encountered in the mine development and hauled to surface before the completion of the underground crusher will be stockpiled on surface and then hauled back underground and crushed using the main crusher.

UNDERGROUND MOBILE EQUIPMENT

The underground mining fleet will consist of the units as shown in Table 16-1 for the mine development, production and ancillary operations.

TABLE 16-1 UNDERGROUND MOBILE EQUIPMENT
Avalon Rare Metals Inc. – Thor Lake Project

	Size	Units Required
LHD- Development	6 m ³	3
LHD- Production	6 m ³	3
Jumbo	2 boom	4
Bolting Jumbo		2
Haul Trucks	30 to 40 t	3
Long Hole Drill		1
Scissor Lift		3
Utility Truck		3
ANFO Loader		2
Man Carrier		2
Mechanic's Vehicle		1
Electrician's Vehicle		1
Service Truck		1
Crusher/Conveyor Service		2
Light Vehicles		6
Tractor/Back Hoe		1
Bobcat		1
Tool Handler		1
Portable Compressors		3

The LHDs, trucks and jumbos will be required for the mine development and will be utilized by contractors for the preproduction period. In operations these units are expected to experience relatively low utilization but the fleet size is considered necessary to provide the back up for this remote site operation.

Equipment will be selected based upon price and support and it is planned to purchase as many units as possible from one supplier to minimize the number of suppliers and to increase the level of common spares to the extent possible.

MINE INFRASTRUCTURE

CRUSHING AND CONVEYING

The mine crushing and screening will take place underground. Ore will be dumped into a single dump point feeding the ore pass. The dump will be equipped with a grizzly and rock breaker. The crushing circuit is described in more detail in section 18.

Based upon an initial layout provided by FLSmidth, the primary crusher will be located in a chamber that is 11 m by 30 m by 15 m high. The secondary crusher, tertiary crusher and screens will be located in an adjacent 11 m by 30 m by 20 m high chamber. Separate vehicle access ways will be driven to the floor elevation of each chamber.

From the crusher ore is delivered to a 1,000 t fine ore bin before being conveyed to surface. RPA considers the 1,000 t fine ore bin to be too small for efficient operation, generally the fine ore bin should have the capacity to hold 30 hours of mill feed. The proposed bin is considerably smaller with only 12 hours of mill feed capacity in total.

RPA notes that the main conveyor feeds directly to the rod mill and accordingly recommends that in the next stage of studies the conveyor be equipped with a belt scale and variable frequency drives, which would be controlled by the mill operator, on the drives.

Ore encountered in the mine development and hauled to surface before the completion of the underground crusher will be stockpiled on surface and then hauled back underground and crushed using the main crusher.

ELECTRICAL DISTRIBUTION

Electrical power will be generated at a diesel power station located at the site. The power will be generated and distributed about the site at 600V and 4,160 V. The feed to the mine will be by 4,160 V power cables installed in the decline feeding load centers with 4,160:600 V transformers. When the ventilation raise is in place an additional line may be installed in the raise to provide a loop for power distribution. In the alternative, bore holes may be used as conduit for power lines to the underground mine to provide multiple feeds and to reduce the line loss with the shorter supply cables.

Electrical power will be required at the crushing plant and then in mobile load centers to provide power for jumbos and fans in the development and production areas. An electrical power supply to the main surface fan location will also be required.

UNDERGROUND POWER REQUIREMENTS

The estimated power consumption for the underground mining, including ventilation but excluding the crushing plant and conveyors is 0.85 MW as shown in Table 16-2.

TABLE 16-2 ESTIMATED ELECTRICAL LOAD
Avalon Rare Metals Inc. – Thor Lake Project

Load Description	No. Units	Unit HP	Connected HP	Load Factor	Load (kW)	Utilization Factor	Energy/ month (kWh)
Surface Plant – Main Shaft Area							
Air Compressors	2	150	300	67%	201	70%	102,655
Shop Equipment	1	15	15	40%	6	20%	875.52
Hot Water Heaters	1	25	25	70%	18	60%	7,661
Lighting	1	15	15	90%	14	40%	3,940
Office etc.	1	20	20	40%	8	40%	2,335
Surface Plant -Vent Shaft Area							
Main Ventilation Fans	1	300	300	95%	285	100%	207,936
Pumps	1	25	25	75%	19	67%	9,166
Lighting	1	10	10	90%	9	50%	3,283
Shops	1	20	20	50%	10	40%	2,918
Portable Welder	1	25	25	80%	20	10%	1,459
Heat Trace	5	30	150	100%	150	40%	43,776
Underground							
Main Dewatering Pumps	2	50	100	80%	80	40%	23,347
Sump and Mud Pumps	1	13	13	80%	10	40%	3,035
Definition Diamond Drill	1	75	75	90%	68	70%	34,474
Diamond Drill Recirculation Pumps	2	10	20	80%	16	80%	9,339
Stope Fans	4	50	200	70%	140	100%	102,144
Development Duct Fan	4	20	80	90%	72	100%	52,531
Electric-Hydraulic Drill Jumbo	2	150	300	80%	240	60%	105,062
MacLean Roof Bolter	1	100	100	80%	80	60%	35,021
Lunch Room	1	20	20	80%	16	30%	3,502
Underground Lighting	1	15	15	90%	14	100%	9,850
Subtotals		1,828			1,474		764,309
Contingency		10%			10%		10%
Total Connected Horsepower (HP)		2,011					
Total load (kW)					1,622		
Diversification Factor					70%		
Maximum Demand (kW)					1,135		
Monthly Energy Consumption	(kWh)						840,740
Daily Energy Consumption	(kWh)						27,656

VENTILATION

The ventilation plan is to isolate the eastern mining fronts from the west. Air flow into the east mining fronts will exhaust through the east exhaust raise and air flow through the west will exhaust up the ramp in addition to the regulated airflow through the crusher station. A series of regulators at the base of the intake raise on the west and the exhaust raise in the east will regulate flow with a planned 150,000 cfm air flow on the west end and 200,000 cfm air flow on the east. In addition to the primary ventilation circuit there will be a number of auxiliary ventilation fans and ducting to provide ventilation for development headings and for stope ventilation.

The mine ventilation is planned to consist of a fresh air fan atop the centrally located fresh air intake raise. The intake system will include the mine air fans and direct fired propane mine air heaters. The intake raise will also serve as a service raise for power lines and as an emergency escape way.

The mine ventilation air flow has been based upon the mine equipment fleet with an estimate of utilization and an additional allowance for losses and additional needs. The basis for the estimate of 350,000 cfm is summarized in Table 16-3.

It has been assumed that the presence of radon and thoron gas from the rock will not be an issue and that these contaminants will be appropriately diluted and exhausted with the mine air. Procedures for closing unused areas and for checking areas prior to reopening unventilated areas will be established to ensure that areas are suitably ventilated and that there are no noxious gases present before work commences in a new area or an area which has been closed for some time.

TABLE 16-3 MINE VENTILATION REQUIRED
Avalon Rare Metals Inc. – Thor Lake Project

		Units	CFM	Total CFM	Usage	CFM
LHD- Development	6 m ³	3	18,000	54,000	0.6	32,400
LHD- Production	6 m ³	3	18,000	54,000	0.6	32,400
Jumbo	2 boom	3	7,000	21,000	0.5	10,500
Bolting Jumbo		2	7,000	14,000	0.6	8,400
Haul Trucks	30 to 40 t	5	25,000	125,000	0.5	62,500
Long Hole Drill		1	7,000	7,000	0.2	1,400
Scissor Lift		3	7,000	21,000	0.5	10,500
Grader		1	7,000	7,000	0.5	3,500
Utility Truck		3	7,000	21,000	0.5	10,500
ANFO Loader		2	7,000	14,000	0.5	7,000
Man Carrier		2	5,000	10,000	0.5	5,000
Mechanic's Vehicle		1	5,000	5,000	0.5	2,500
Electrician's Vehicle		1	5,000	5,000	0.5	2,500
Service Truck		1	5,000	5,000	0.5	2,500
Crusher/Conveyor Service		1	5,000	5,000	0.5	2,500
Light Vehicles		6	4,000	24,000	0.5	12,000
Tractor/Back Hoe		1	5,000	5,000	0.5	2,500
Bobcat		1	5,000	5,000	0.5	2,500
Tool Handler		1	7,000	7,000	0.5	3,500
Portable Compressors		3	3,000	9,000	0.5	4,500
Air Drills/Stoppers						
Total				418,000		219,100
Losses		0.2				43,820
Requirement						262,920
To ensure adequate air for three possible mining fronts						350,000

MINE AIR HEATING

In light of the sub-zero temperatures and the need to maintain the mine in an unfrozen state to prevent freezing of water lines and or ground water the mine air will be heated using direct fired mine air heaters located at the mine air intake. The mine air heaters will be approved units with appropriate controls and automated shut down and alarms in the event of no flame or excessive carbon monoxide.

Based upon the air flow of 350,000 cfm and heating of mine air to 35°F and the average annual temperatures for Yellowknife the mine air heater will operate from late October to late April in each year. The estimated propane consumption in this period is approximately two million litres.

MINE FAN HORSE POWER

The mine fan horsepower at 350,000 cfm is estimated to be 300 hp.

$$H = \frac{k \times \text{length} \times \text{perimeter} \times (\text{flow in } 100,000 \text{ cfm})^2}{5.2 \times \text{heading area}^3}$$

RPA recommends that further planning and analysis be completed to determine the optimum fan and motor combination for the initial ventilation and for the increased air flow at the expanded rate.

DEWATERING

The mine is not expected to be a “wet” mine and ground water inflows are expected to be low with a maximum estimated 50 gpm of groundwater inflow into the mine. The estimate of groundwater inflow has been based upon the observations of the numerous core drill programs and observations from the test mine previously developed at the Thor lake site.

The estimated water inflow is:

- Groundwater 50 gpm
- Drilling – 2 gpm/ boom – 10 gpm
- Diamond drilling 10 gpm
- Mine dust suppression – carried on rock
- Crusher dust control – 7 gpm (Melis)

Excess water from backfill has not been considered as backfill plans call for the use of paste fill and the plan would be to use a fill which used all of the contained water for hydration of the binder.

The total estimated water inflow is approximately 80 gpm. All water will be diverted to the base of the decline either along the decline or by boreholes specifically installed for mine drainage.

The main mine dewatering pumps will be designed to operate on automatic controls. The low head pumps at the sump will operate on automatic controls such that high levels in the sump activate the operation of the pumps.

BACKFILL

In order to maximize the extraction of the higher grade resources in the Basal Zone, the use of a fill-based mining method is proposed. The selected fill should be competent to stand over a 20 m to 30 m vertical height while the secondary stope is being extracted. The key alternatives for back fill are:

- Crushed cemented waste rock
- Cemented hydraulic fill
- Paste fill

RPA considers paste fill to be the best alternative as the material is readily available, it reduces the tailings impoundment needs, suitable strength can generally be attained and there is no additional water to be handled by the mine dewatering system.

Distribution of the paste fill is proposed to be via pipeline installed in the main decline. The paste plant would be installed as part of the process plant to allow operation as part of the mill operations.

In the shallow sections of the deposit the use of waste fill to provide a mucking floor may be practical.

PASTE FILL SYSTEM

The initial specific testing of the tailings material to assess its suitability for use in paste fill has commenced. Golder Paste Technology Inc (Golder Pastec) completed testwork to assess the material characteristics of tailings samples to assess the suitability of the material for paste fill (2011). The tests assessed material characteristics, rheological, dewatering and strength properties. Golder Pastec noted that the materials tested demonstrated the required properties for producing a suitable paste fill material.

The material tested has a higher fines content (50% minus 20 micron) compared to the required 15% minus 20 micron but the sample demonstrated good settling and dewatering properties with the overflow quality improved by two stage of flocculant addition. One of the two samples had slump test results indicating it was very sensitive to water addition.

The UCS test results indicated that the UCS increases with a higher weight percent solids and with higher binder addition. With 3% normal Portland cement and 7" slump the 28 day UCS was approximately 0.2 MPa while at 5% cement addition the UCS rose to approximately 0.45 MPa.

Golder Pastec recommended testing of additional samples and larger scale testing to develop better predictions of underflow density, flow characteristics and optimum UCS.

RPA recommends that a specification for the paste fill be developed and as soon as tailings materials are available (from bulk tests or operations) a more detailed testing program should be undertaken.

For this study RPA has estimated that a cement addition of 4% will be required for the fill for the primary stopes. The same cement addition rate is planned for the secondary stopes to provide cement for the hydration of water so that water from backfill operations does not become an issue in the mine. If a higher binder addition is required there will be an increase in the mine operating costs.

There is not a large quantity of waste development forecast after the initial mine development but any waste from development will be used for filling secondary stopes.

The annual cement requirement commencing Year 2 of operations is 36,500 tonnes or 1,825 containers with bulk bags of cement powder.

MINE MAINTENANCE

The larger maintenance work on the mine equipment will be competed in surface heavy equipment shops located adjacent to the mill complex. This work will include all major repairs and major services. The surface shop will be used for the surface and underground mobile equipment at the site.

MAINTENANCE BAY

A maintenance bay will be constructed underground to accommodate underground vehicles for minor repairs and minor and intermediate service interval work. A level of parts and supplies for routine services and repairs will be maintained in the underground mine.

The maintenance shop will consist of an excavated area located near the crushing station and decline access (up cast ventilation). Maintenance activities will include scheduled preventative and predictive maintenance, troubleshooting, short & long term rebuilds and equipment installations. Most consumable parts will be kept on the surface with a small rotating supply underground.

FUEL AND LUBRICANTS

The estimated daily diesel fuel requirement for the mine is approximately 2,000 litres. As most of the equipment will not be on surface regularly it will be advantageous to provide fuel to the units underground. Approximately 80% (1,700 l/d) of the daily fuel will be for units that are not routinely expected to travel to surface. The alternatives for fuel delivery are:

- Refueling on surface for all but the slowest of units (jumbos and compressors)
- Fueling underground from a mobile fuel handler
- Installation of an underground fuel bay
 - With fuel delivery by fuel truck or mobile fuel tanks
 - With fuel delivery via “dry line”

RPA recommends that equipment initially be refueled on surface and then after the mine development phase is complete a refueling area be used with a temporary fuel tank that is filled on surface and brought underground on a daily basis.

Used oil will be collected wherever it is generated and brought to surface for appropriate disposal by incineration in an approved incinerator with the recovery of heat for use in the plant or shop areas.

MISCELLANEOUS

MATERIAL STORAGE

Material storage will be built underground for short term storage of mine supplies such as rock bolts, mesh and ventilation duct and spare fans. These bays will be located near the service area and will be accessed by mobile equipment such as the forklift and tool handler.

COMMUNICATIONS

Mine communications will consist of telephone service to the main mine switchboard as well as radio communications through a leaky feeder system. The communications system will also be used for monitoring and control of production equipment, ventilations systems, dewater and backfill.

EXPLOSIVES

Detonators, primers and stick powder will be stored in separate approved explosives magazines which will be located underground. If practical all of these explosives will be stored in the underground magazines to eliminate the need for surface explosives magazines.

The main explosive planned for use at the TLP is ANFO which will be prepared on a batch basis from the combination of ammonium nitrate and diesel oil in an approved ANFO mixing facility to be located within the mine. However, there will still be a requirement for packaged slurry explosives and "stick" powder for wet holes or for boosting the ANFO in some applications. These are easily provided by the explosives manufacturer in containers which will be stored and inventoried underground.

At a rate of 0.8 kg of ANFO per tonne blasted the annual ANFO requirement is estimated to be 292 t. An allowance of 10% of the total explosives for stick powder and package slurry is recommended for purchase and storage on site.

An non electric detonation system will be used with in the hole delays on all detonators. A range of delay periods will be required and approximately 45,000 are required for a year of operation.

Costs have been based upon the use of Nonel detonators however, RPA recommends that Avalon investigate and consider the electronic initiation systems that are now available as this may provide better fragmentation and ground control.

SANITARY SYSTEM & POTABLE WATER

Potable water for the underground mine will be provided in specific containers that will be resupplied regularly from the site potable water supply. Sanitary facilities in the mine will be approved self contained units,

ROAD MAINTENANCE

A grader will be included in the equipment fleet for the maintenance of underground roadways, the key focus will be on the stope access drifts and cross cuts as the main ramp is not planned to be a main haulage way and will therefore require less maintenance.

MINE DEVELOPMENT

Mine development will commence with the development of the decline to the crusher elevation. The advance will be single heading advance until the decline passes the first stope access ramp junction.

The goal of the initial mine development will be to get to and develop the crusher station and to get to the base of the ventilation raise. Additional ramp access headings to the stoping areas will provide access to stopes that will be available for production with completion of the 30 m to 50 m long stope access crosscuts (some of which will be developed for material storage as the development progresses).

Initial mine development will be undertaken by a mine development contractor to provide the skills needed to complete the work. As the main development is completed the work will shift to company crews and equipment for the production phase of the operation.

The development schedule does not include any allowance for exploration development or for the development of underground diamond drill stations for further exploration of the deposit.

PRODUCTION SCHEDULE

Mine production will come from primary stopes which are planned to be developed from the stope access crosscut. Each 5 m high by 15 m wide cut will generate approximately 20,000 tonnes of ore.

The production schedule was developed based on mining of the highest value ore in the early years. Feed grades at Thor Lake do not vary over a wide range but there are higher grade areas and the zone at the bottom of the Basal Zone carries the highest grades. The Production schedule is shown in Table 16-4.

At the planned production rates this generates a mine life of 20 years from the Basal Zone Probable Mineral Reserves.

HEALTH AND SAFETY

Safety procedures and mine training programs will be developed for all personnel working in the mine. Emergency procedures as required under the Mining Regulations will be prepared and submitted for approval as required.

All crew will be issued TLDs to monitor the exposure to radiation in the work place. Records will be maintained and exposure limits will be set such that if workers are exposed to radiation above a certain limit they will be moved to a different work area to reduce their exposure and to maintain safe working conditions.

In addition, radon and thoron (radon isotope produced by thorium) levels within the mine and plant air would be monitored to ensure that mine ventilation is sufficient to reduce radon and thoron to acceptable concentrations.

Refuge stations will be installed in the vicinity of the most active work places and a secondary egress will be in place before production commences.

Site crews will be trained in mine rescue procedures and a mine rescue station will be set up and equipped to respond to an emergency. The mine will purchase and maintain a set of BG-4 breathing apparatus as well as SCBA's for use on surface. Procedures for maintaining contact with other operating mines with regards to their mine rescue teams will be implemented.

A diesel operated ambulance will be maintained at the site for use on surface and underground and a fully equipped first aid room will be set up and maintained and there will be first aid coverage at the site at all times.

Surface firefighting equipment will be kept on site and hydrants and hose stations for firefighting will be installed at strategic locations on surface.

FUTURE MINING

The mining within this section is restricted to material that can be converted to Probable Mineral Reserves. In addition to the resources extracted in the LOM presented above, there are significant Indicated and Inferred Resources within the Thor Lake Project. Additional mine planning and exploration is recommended to permit the development of the most efficient exploration and exploitation plan for the additional resources.

TABLE 16-4 MINE PRODUCTION FORECAST
Avalon Rare Metals Inc. – Thor Lake Project

		Total	Year -2	Year -1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21
MINING																									
Operating Days	tpd				365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365
Plant Throughput	000 tonnes	14,539	1,833	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Ore Mined			669	730	730	730	730	730	730	730	730	730	730	730	730	730	730	730	730	730	730	730	730	730	730
TREO	ppm	15,337	18,949	19,209	18,318	18,540	16,211	16,332	15,217	14,031	14,314	13,570	13,290	14,608	13,555	14,683	13,877	14,392	14,714	13,665	13,905	15,667			
Nb ₂ O ₅	ppm	3,780	4,542	4,646	4,434	4,391	3,830	3,930	3,567	3,466	3,589	3,382	3,357	3,629	3,512	3,652	3,491	3,796	3,880	3,405	3,299	3,872			
Ta ₂ O ₅	ppm	414	536	539	519	506	412	439	382	368	387	361	340	401	383	376	356	396	414	367	375	430			
ZrO ₂	ppm	28,998	35,406	36,383	33,438	34,106	28,620	29,644	26,353	25,320	26,937	24,525	22,568	28,525	26,421	28,399	24,481	30,087	32,294	27,225	27,753	32,003			
CONCENTRATION – THOR LAKE																									
Ore Milled	000 tonnes	14,539	669	730	730	730	730	730	730	730	730	730	730	730	730	730	730	730	730	730	730	730	730	730	730
TREO	ppm	15,337	18,949	19,209	18,318	18,540	16,211	16,332	15,217	14,031	14,314	13,570	13,290	14,608	13,555	14,683	13,877	14,392	14,714	13,665	13,905	15,667			
Nb ₂ O ₅	ppm	3,780	4,542	4,646	4,434	4,391	3,830	3,930	3,567	3,466	3,589	3,382	3,357	3,629	3,512	3,652	3,491	3,796	3,880	3,405	3,299	3,872			
Ta ₂ O ₅	ppm	414	536	539	519	506	412	439	382	368	387	361	340	401	383	376	356	396	414	367	375	430			
ZrO ₂	ppm	28,998	35,406	36,383	33,438	34,106	28,620	29,644	26,353	25,320	26,937	24,525	22,568	28,525	26,421	28,399	24,481	30,087	32,294	27,225	27,753	32,003			
Concentrator Mass Pull	%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%
Flotation Concentrate	000 dmt	2,617	120	131	131	131	131	131	131	131	131	131	131	131	131	131	131	131	131	131	131	131	131	131	
Moisture Content in Conc.	%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Wet Weight of Flotation Conc.	000 wmt	2,879	132	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145
Flotation Recovery																									
TREO	%	79.5%	79.5%	79.5%	79.5%	79.5%	79.5%	79.5%	79.5%	79.5%	79.5%	79.5%	79.5%	79.5%	79.5%	79.5%	79.5%	79.5%	79.5%	79.5%	79.5%	79.5%	79.5%	79.5%	79.5%
Nb ₂ O ₅	%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%
Ta ₂ O ₅	%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%
ZrO ₂	%	89.7%	89.7%	89.7%	89.7%	89.7%	89.7%	89.7%	89.7%	89.7%	89.7%	89.7%	89.7%	89.7%	89.7%	89.7%	89.7%	89.7%	89.7%	89.7%	89.7%	89.7%	89.7%	89.7%	89.7%
HYDROMETALLURGY – PINE POINT																									
Plant Feed	000 tonnes	2,617	60	126	131	131	131	131	131	131	131	131	131	131	131	131	131	131	131	131	131	131	131	131	66
TREO Recovery	%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%
Nb ₂ O ₅ Recovery	%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
Ta ₂ O ₅ Recovery	%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
ZrO ₂ Recovery	%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Production																									
TREO	tonnes	164,869	4,687	9,871	10,127	9,947	9,378	8,782	8,514	7,893	7,649	7,525	7,249	7,529	7,600	7,620	7,707	7,629	7,855	7,658	7,440	7,980	4,228		
Nb ₂ O ₅	tonnes	30,296	838	1,772	1,827	1,775	1,654	1,561	1,508	1,415	1,420	1,403	1,356	1,405	1,437	1,441	1,437	1,466	1,544	1,466	1,349	1,443	779		
Ta ₂ O ₅	tonnes	1,895	56	118	122	118	105	98	94	86	87	86	81	85	90	87	84	86	93	90	85	93	49		
ZrO ₂	tonnes	340,360	9,564	20,284	20,574	19,903	18,483	17,168	16,500	15,226	15,398	15,164	13,877	15,055	16,191	16,154	15,582	16,079	18,382	17,538	16,200	17,608	9,430		
Total Tonnage Sold	tonnes	537,420	15,145	32,046	32,649	31,743	29,621	27,610	26,617	24,621	24,554	24,177	22,562	24,075	25,317	25,302	24,810	25,261	27,874	26,752	25,074	27,124	14,487		

17 RECOVERY METHODS

THOR LAKE CONCENTRATOR PROCESS DESCRIPTION

BASIS

The flotation and hydrometallurgical plant process developed for the PFS and described below is based on metallurgical design data provided by Goode, consultant to Avalon Rare Metals Inc., which in turn were collated from testwork completed by SBM Mineral Processing and Engineering Services LTD at SGS Lakefield Research Limited (SBM, 2009). The grinding circuit design is based on test data provided by Starkey & Associates Inc. (2009). The process design criteria developed from these data are summarized below.

PROPOSED PROCESS FACILITIES

The proposed process comprises crushing, grinding, flotation plants located at Thor Lake and a Hydrometallurgical facility near Pine Point on the south shore of Great Slave Lake. The facility will initially process mineralized material mined at a rate of approximately 1,800 tpd in the first year and will ramp up to process 2,000 tpd from the second year onwards.

The proposed process facilities at Thor Lake comprise a crushing plant, sized for the ultimate tonnage, located in the mine and designed to reduce rock from run-of-mine size to -15 mm. Crushed material is stored in a fine ore bin excavated in the rock, and conveyed up the mine access incline to a rod mill – ball mill grinding circuit. Ground ore is conditioned then de-slimed in a series of three hydrocyclones, and pumped to magnetic separation circuit. This circuit comprises a first magnetic separator, a regrind mill to process the concentrate and a cleaner magnetic separator. Non-magnetic product is pumped to a thickener.

Thickener underflow is diluted and conditioned ahead of rougher-scavenger flotation. Scavenger tails are initially sent to a tailings storage facility but will be processed for paste backfill production for the mine after the initial couple of years operation. Flotation concentrates are cleaned in four counter-current stages to produce a cleaner concentrate which is subjected to gravity separation then thickened and dewatered in a filter press. The gravity tailings are reground and returned to rougher flotation.

Dewatered concentrate is conveyed to special containers able to hold 40 t of concentrate. Filled containers are stored until concentrate transportation is scheduled at which time they are taken across Great Slave Lake to the dock at Pine Point and transported to the hydrometallurgical facility.

The crushing plant is designed for the expansion tonnage. The grinding circuit will require the addition of a second ball mill to handle the expansion tonnage. Additional flotation cells, gravity separation units and filters will also be needed.

In the proposed operation, full concentrate containers are stored at the hydrometallurgical facility and retrieved and placed in a thaw shed as required. The concentrate is thawed and then dumped into reclaim system that conveys the material into the hydrometallurgical plant. Concentrate is “cracked” using a combination of acid baking, caustic cracking, and leaching using sulphuric acid and sodium hydroxide as the primary reagents.

The solid residue from the cracking system is combined with other waste streams and sent to the hydrometallurgical tailings storage facility. The solution arising from the cracking process is subjected to double salt precipitation, solution pre-treatment and solvent extraction processes to isolate the values. Products are precipitated as basic salts, processed and dried to yield hydrated oxides which are packaged for shipment to markets. Products are be trucked to Hay River for on-shipment by rail.

The proposed hydrometallurgical process plant consumes a significant quantity of reagents which will be brought to site by rail to Hay River and then by truck to the plant. Sulphuric acid is to be produced in a 700 tpd capacity double-contact, double absorption plant from elemental sulphur. Excess heat from the sulphuric acid plant is used in the hydrometallurgical process in the thaw shed, to evaporate process solutions, and in the product driers.

Limestone is quarried near Enterprise and crushed and ground to -44 µm for use as a neutralizing reagent in the process. Some limestone is calcined to lime for neutralizing purposes.

Other reagents, such as sodium hydroxide, fuel, solvent extraction reagents, etc. are stored at site as needed.

Most of the hydrometallurgical complex, including the acid plant, is designed and constructed for the ultimate tonnage equivalent to 2,000 tpd of flotation concentrate. Units requiring duplication or addition for the expansion tonnage include the thaw shed, acid bake and caustic cracking facilities, and some of the product driers.

PROCESS DESIGN CRITERIA

The principal design criteria selected for the pre-feasibility study are tabulated below in Table 17-1. The flowsheet used as the basis for flotation recoveries used in the PFS is shown in Figure 17-1 and the flowsheet used as the basis for hydrometallurgical recoveries used in the PFS is shown in Figure 17-2.

TABLE 17-1 PRINCIPAL PROCESS DESIGN CRITERIA
Avalon Rare Metals Inc. – Thor Lake Project

General

Processing rate	tpa	730,000
	tpd	2,000
Feed grade	% ZrO ₂	2.84
	% TREO	1.50
	% HREO	0.39
	% Nb ₂ O ₅	0.37
	% Ta ₂ O ₅	0.040

Flotation Plant

Operating time	hr/a	8,000
Processing rate	tph	91.2
(Ball mill, flotation cells, gravity units, and filters added)		
Underground crusher product	100% passing mm	15

Grinding circuit

		Rod and ball mill
Final grind	80% passing micrometres	38
Slimes-free non-magnetics	% feed	18
Final concentrate mass	% feed	18
Recovery to final concentrate	% ZrO ₂ in feed	89.7
	% TREO in feed	79.5
	% HREO in feed	79.5
	% Nb ₂ O ₅ in feed	68.9
	% Ta ₂ O ₅ in feed	63

Hydrometallurgical Plant

Operating time	hr/a	7,582
Processing rate	tph	17.4
Acid bake temperature	°C	250
Acid addition	kg/t concentrate	700
Caustic crack temperature	°C	600
Net caustic addition	kg/t concentrate	140
Post double salt precipitation SX feed rate	m ³ /h - expansion throughput	83
(All SX units sized for expansion, some driers added for expansion)		
Recovery to final products	% ZrO ₂ in concentrate	90
	% TREO in concentrate	93
	% HREO in concentrate	93
	% Nb ₂ O ₅ in concentrate	80
	% Ta ₂ O ₅ in concentrate	50

Sulphuric Acid Plant

Annual average capacity	tpd 100% acid	700
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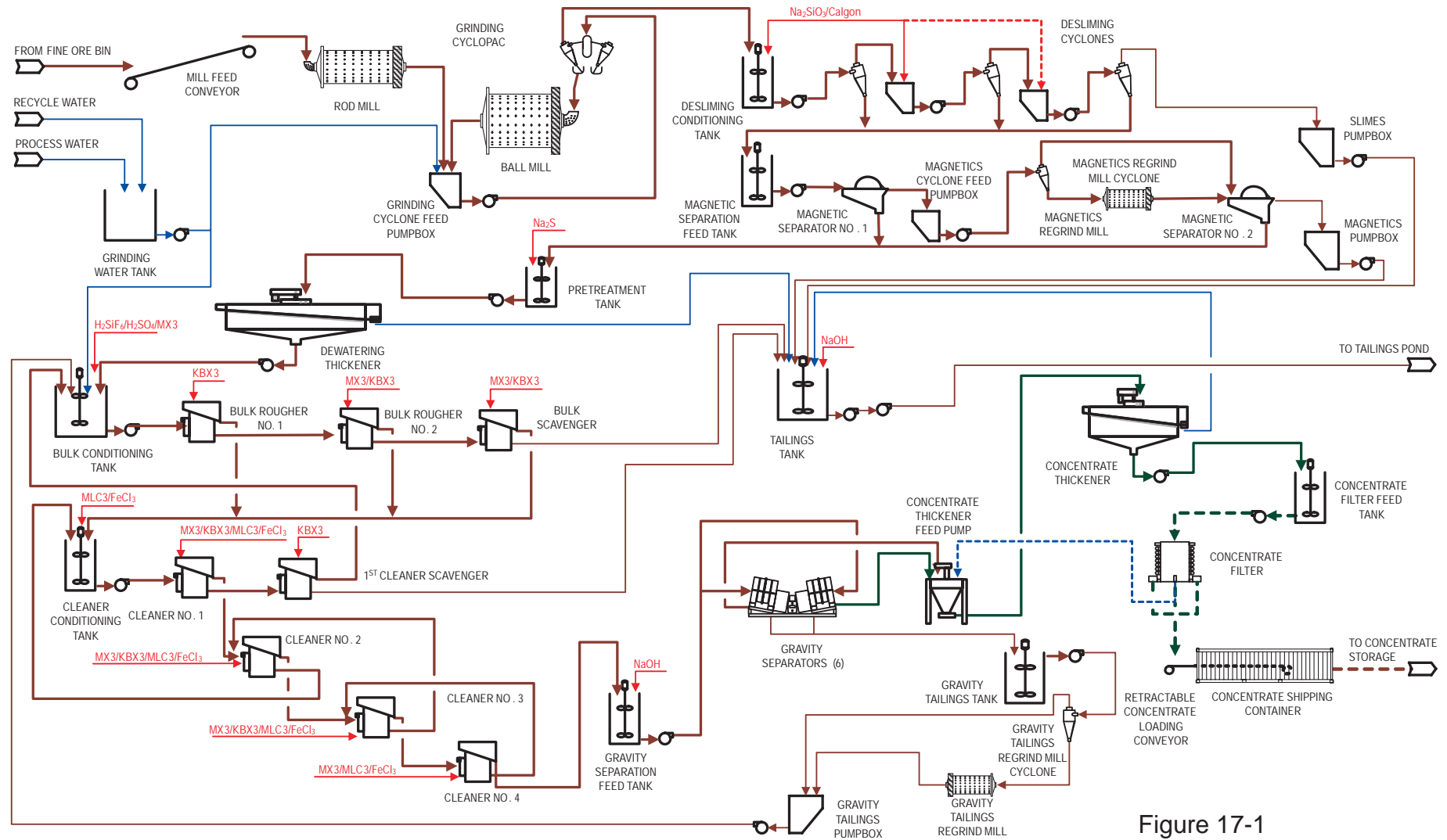


Figure 17-1

Avalon Rare Metals Inc.

Nechalacho Project
Northwest Territories, Canada
Flotation Plant Flowsheet

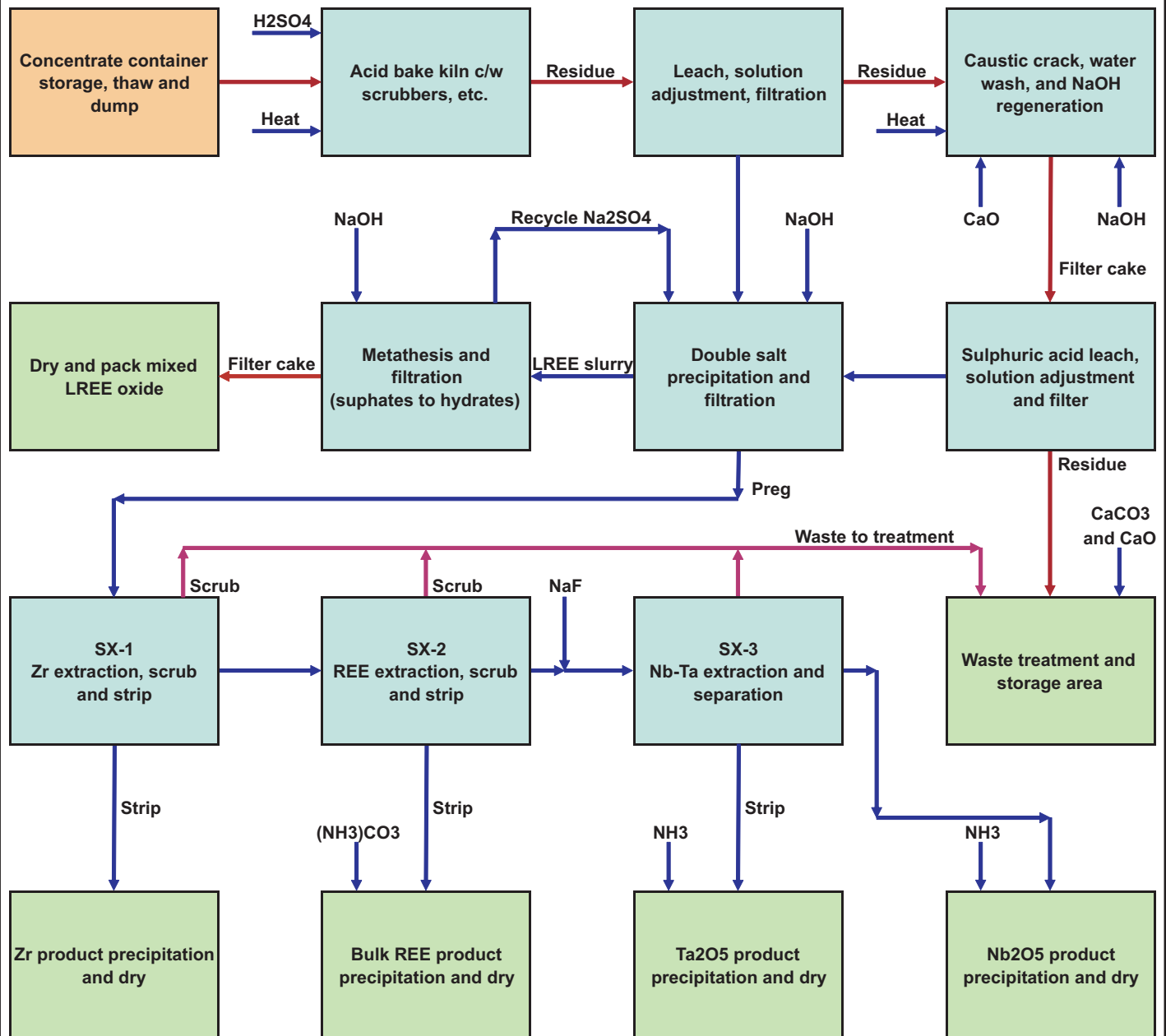
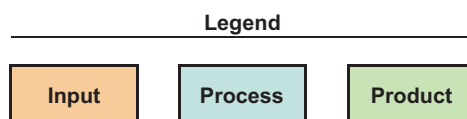


Figure 17-2



Avalon Rare Metals Inc.

Nechalacho Project
Northwest Territories, Canada

**Hydrometallurgical
Plant Flowsheet**

ASSAY AND METALLURGICAL LAB

The mine is expected to generate about 40 samples per shift for analysis, or 80 samples per day, with four from the each working face. In addition, there may be a further 10 or 20 samples of various kinds such as muck samples, low grade stockpile samples, etc. These rock samples will be prepared in an area shared with the metallurgical laboratory and described below.

The flotation plant will produce composite solids samples for each shift from feed, magnetic tailings, slimes tailings, four flotation products, and gravity tailings. Additionally, each product container will be sampled meaning about eight product samples per day in the initial years. In total there will initially be 24 solid samples per day rising to 32 samples per day. In addition to the analytical work on the solids, eight samples will be processed for screen analyses on a daily basis in the metallurgical laboratory.

All solution samples will be sent to the ALS Laboratory in Yellowknife, or a similar organization, for analysis.

Slurry samples will be filtered in the mill and wet filter cakes, and solution where appropriate, delivered to the sample preparation area at the end of each shift.

Mine and mill samples will be initially dried in a large oven. High grade samples, such as concentrate will be processed in a separate drying oven. Coarse samples will then be crushed to -10 mesh and finally pulverized to 100% passing 100 mesh. High grade samples will be batch processed through the same equipment following a thorough cleaning with sand.

A 10 g sample of pulverized material will be split for assaying.

Solid samples will be analyzed using an INNOV-X X-5000™ mobile XRF unit. It is estimated that 100 samples can be processed in a 10 hr shift. Two X-5000 machines will be required in order to maintain sufficient productivity and for backup.

QA/QC standards will be developed for the laboratory including protocols for duplicates and for external checks.

The sample preparation and assay laboratory will require the services of a Chief Assayer, two sample preparation technicians and an assayer for a total of four. Two such crews would be needed, one on site and one on a rest period.

A metallurgical laboratory at Thor Lake will be used to prepare and test samples as part of monitoring and improving the performance of the flotation mill.

The Pine Point hydrometallurgical facility will similarly be provided with a comprehensive analytical and hydrometallurgical facility to allow the rapid assays needed for process control and testwork needed to ensure optimal operation of the plant.

ALTERNATIVES

Since the publication of the previous NI 43-101 Technical Report, Avalon has investigated development alternatives in which some or all of the hydrometallurgical processing is performed somewhere other than Pine Point. This approach could substantially reduce the cost of transporting reagents to Pine Point and offer other benefits. One possible option is to acid bake the concentrate at the Pine Point site but caustic crack and complete the rest of the processing at a location where caustic and other reagents are more readily available. This strategy would require that the acid bake solutions generated at Pine Point be processed to produce a shippable precipitate containing most of the light rare earths. The additional hydrometallurgical operation options are being investigated at SGS. Logistic and cost studies of the split hydrometallurgical plant option are on-going at the time of writing.

18 PROJECT INFRASTRUCTURE

The Thor Lake site is an undeveloped site with no road access and the only site facilities are those that have been established for exploration over a number of years. The proposed Pine Point site is a brownfields site with good road access to the property boundary but few remaining local services. The proposed Thor Lake site layout is shown in Figure 18-1 and the proposed Pine Point site layout is shown in Figure 18-2.

THOR LAKE INFRASTRUCTURE

SURFACE INFRASTRUCTURE

The surface facilities will be organized into a compact unit to reduce the need for buses and employee transportation within the site. All facilities will be connected by corridors to provide pedestrian access in all weather conditions between the mill/power house/shops/offices and accommodation units.

CONCENTRATE STORAGE – THOR LAKE SITE

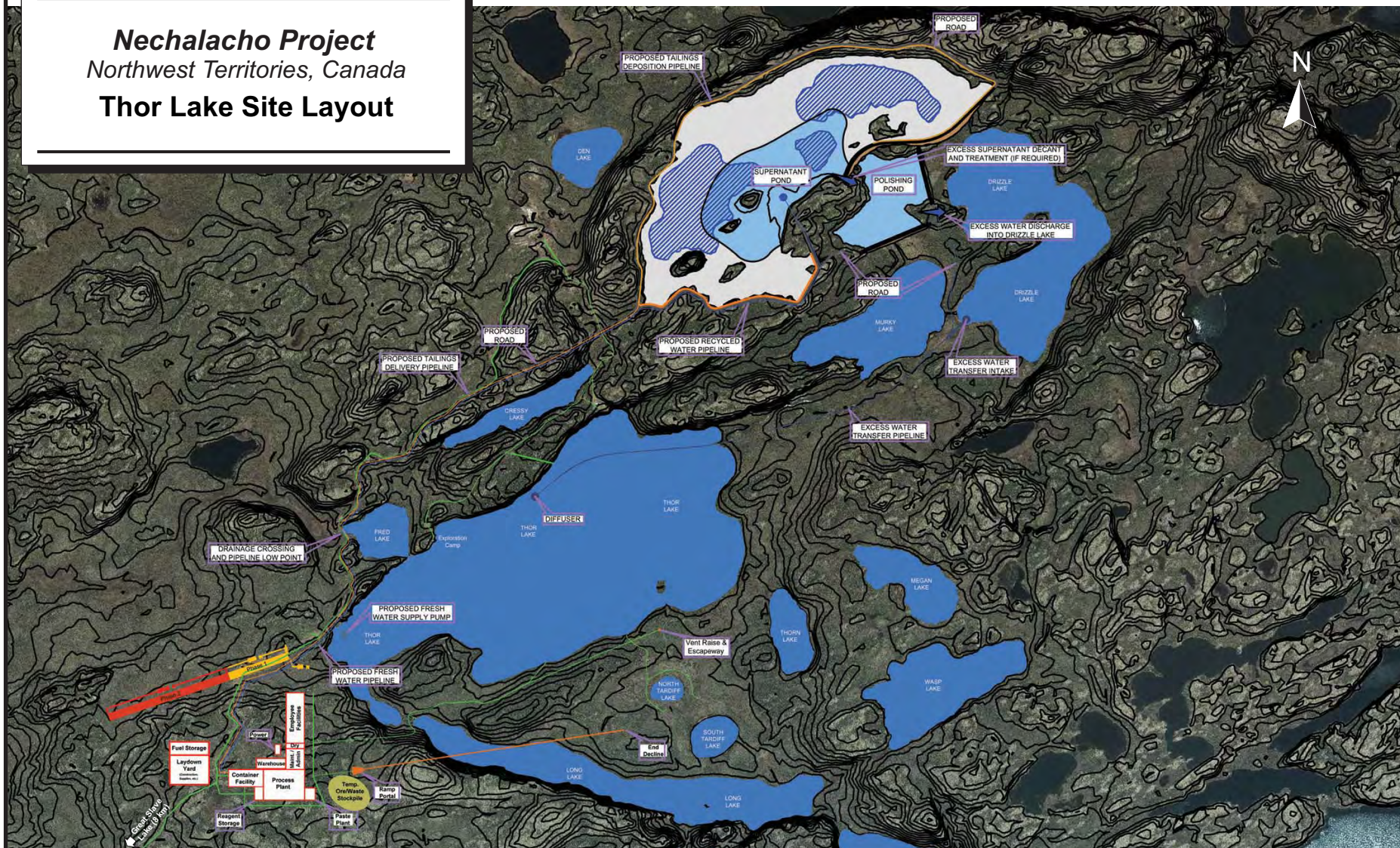
Concentrate is planned to be stored at the Thor Lake and Pine Point sites and transported in custom-designed, covered containers with removable lids. Each container will hold approximately 45 t wet solids as a damp filter cake. There will be approximately 3,300 containers required at each end of the supply chain. Avalon will purchase containers for its exclusive use. Containers will be weighed and stored near the mill at the Thor Lake site through the winter months. If the containers are stored in a single layer a 70,000 m² storage area is required (before allowance for driveways).

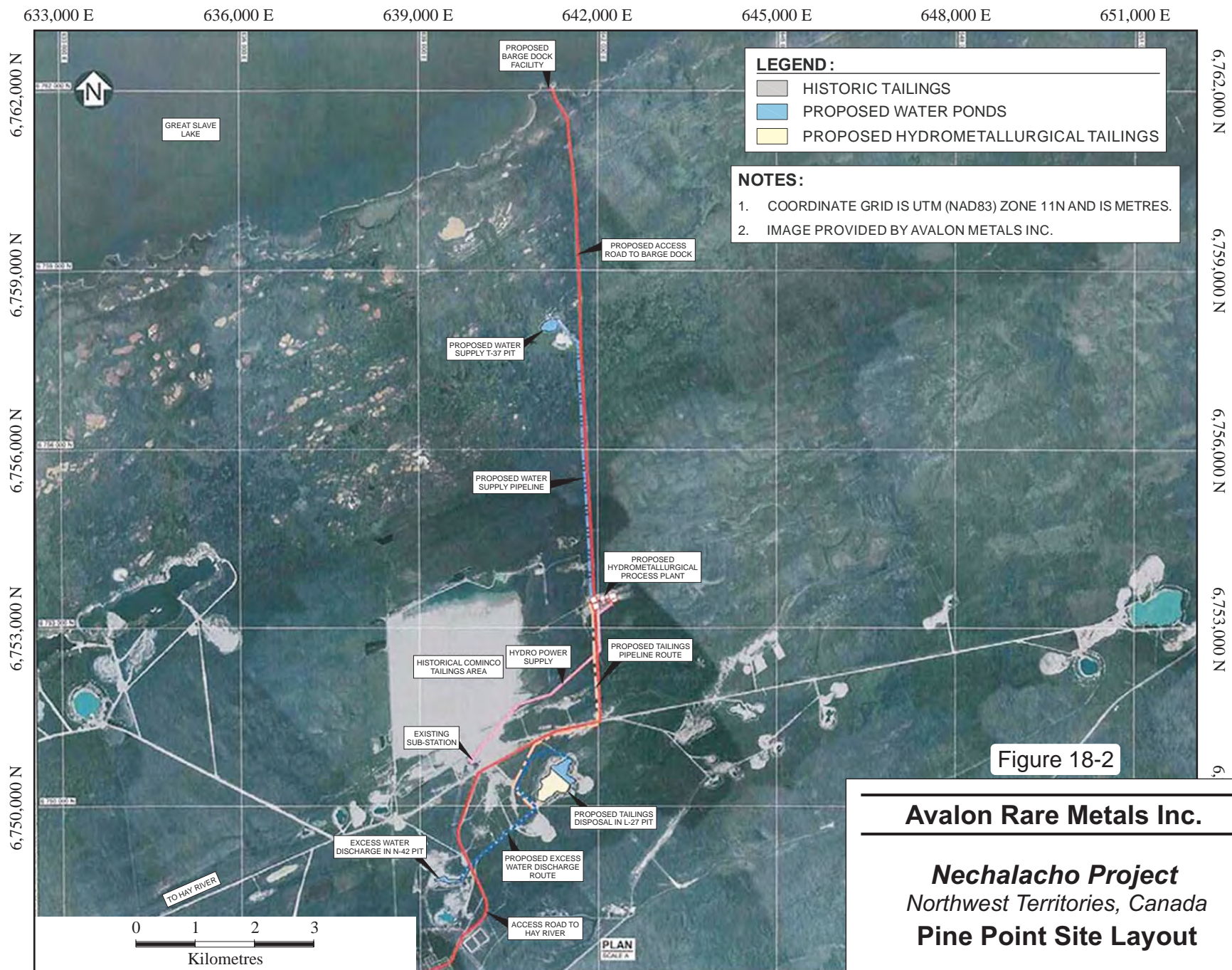
As concentrate quality may vary over an operating year a system for tracking loaded containers and their contents will be developed. The same system will also be required for returning containers so that supplies can be located in a timely fashion.

Figure 18-1

Avalon Rare Metals Inc.

Nechalacho Project
Northwest Territories, Canada
Thor Lake Site Layout





In the spring when roads have cleared and frost is no longer an issue the loaded containers will be moved to the storage area adjacent to GSL so that they are in position for loading when the annual shipping season commences. Containers will be moved short distances at the Thor Lake plant site and at the dock at GSL by container forklift. For the 8 km haul to the GSL dock the containers will be loaded on container trailers at the TLP site and offloaded at the dock site.

TEMPORARY STORAGE AT PROJECT

The storage area at GSL will require space for loaded and empty containers, container movement and loading, fuel storage and some bulk materials storage. The yard will be designed to divert surface drainage away from roads and storage yards and appropriate spill response plans will be developed for the various products that are to be handled in the area.

TEMPORARY ORE & WASTE ROCK STORAGE

Mine development will generate approximately 150,000 tonnes of ore, low grade and waste over the course of the mine development. All of this material will be hauled to surface and either used for surface construction or stockpiled in permanent storage areas for waste and in temporary locations for low grade and ore. The ore will be used as plant feed,

All of the development rock will be from drift roads and is expected to be less than 250 mm in size. The ore will be passed over a grizzly and then crushed in the surface aggregate crusher before being fed into the mill by a front end loader. A small bin and short feed belt to the grinding mill feed may be needed to add the ore from the surface stockpile.

POWER GENERATION & DISTRIBUTION

An initial estimate of the electrical power requirement for the Thor Lake site is shown in Table 18-1. The table does not include an allowance for separate emergency generators which will be required for the camp and may be required for some areas of the flotation plant.

TABLE 18-1 POWER DEMAND
Avalon Rare Metals Inc. – Thor Lake Project

Area	Average (MW) 2,000 tpd
Mill	6.0
Mine	1.2
Camp	0.8
Surface	0.4
Total	8.4

PROPOSED POWER GENERATION SYSTEM

Finning Power systems have provided a proposal for the generating facility at the TLP, which consists of ten modular Caterpillar 3516 - 1.45 MW diesel generators for the provision of 8.4 MW of power. The ten units are based on the N+2 design. Finning provide modular generating units and the electrical switchgear and controls for the generators. The generators and controls are assembled and tested in Finning's Richmond BC facility and then deliver to the site for installation.

The units are constructed such that the switchgear enclosure is between the generators often as the center bar in an "H" layout. This configuration has been provided to other northern mines.

The proposed system includes:

- Ten self contained 4,160 V Caterpillar 3516 generators with a capacity of 1.45 MW each.
- Heat exchangers and engine and exhaust heat recovery systems.
- Roof mounted radiators.
- Engines controls and switchgear.
- Switch gear enclosure with seven 1200 A feeders in cells plus one for station service.
- Switch gear can be expanded to 12 cells in future.
- MCC provided by Finning.

The heat exchangers provide 1,250 kW of thermal energy per running unit with 90° outlet water and 70° return water. The engine after cooler heat recovery is not included as this is a low grade heat source of 300 kW but at 50°.

The Thor Lake site will be required to provide:

- Foundation and space for set up
- 5 kV transformer, external to switch room for station power
- Piping to connect to heat exchanger
- Pump for delivery of heated solution
- High voltage wiring and connections
- Fuel line connections to external day tanks
- High pressure compressed air source for engine exhaust heat exchanger cleaning.

Day tanks for fuel are external to the enclosures but all piping for the fuel is plumbed to the enclosure wall at the time of assembly at the factory.

A high pressure (200 psi) compressed air source is required for the cleaning of the exhaust heat exchanger. The cleaner is installed at the factory and includes the controls to cycle the cleaning of the operating engines. The cleaners need to run once every hour for an operating unit. RPA considers a dedicated compressor for this service to be the appropriate design.

EMERGENCY BACKUP POWER

Standby diesel generators for the camp and critical mill equipment will be required and will be installed in a separate powerhouse so that a major failure or loss of the main power house does not impact the standby units. Two 500 kW units with the ability to synchronize the two will be installed as emergency back-up power.

A diesel generator will be required at the GSL dock to provide power for lights, an office and diesel transfer pumps. A 100 kW unit has been included in the plan for this area. The unit would be mounted in a skid equipped container with its own switchgear and a day tank for operation.

GREYWATER & SEWAGE TREATMENT

The greywater and sewage from the camp and dry and will be sent to a sewage treatment facility (Biodisk or equivalent) after which the water will be discharged with the tailings. Solids in the sewage treatment unit will be removed on an annual basis.

ADMINISTRATION & DRY FACILITIES

Offices for site management personnel will be located within the operations complex. This will include administration, management, mine, process and maintenance personnel.

There will be a requirement for approximately 400 m² office space for the administration, technical, mine and maintenance personnel in a central office location near the dry and camp facility. Mill personnel will have offices in the mill.

WAREHOUSE

A central warehouse located on surface will be established at the TLP site. The heated indoor storage will be supplemented with an organized container storage yard and some outdoor lay down area. The heated indoor storage space will be some 20 m wide by 30 m long. The warehouse area will be manned by a purchasing agent and a stores person operating on site.

MAINTENANCE SHOP

The surface maintenance shop will be used for maintenance of all surface and underground equipment at the TLP site. A good portion of the TLP mobile equipment will be dedicated to the seasonal handling of concentrate and materials however the underground fleet and part of the surface fleet will see service through the year.

The planned shop will have service bays for heavy equipment as well as space for light equipment. The shop will be equipped with an overhead crane for servicing equipment.

A machine shop with milling tools, a lathe, saws and work benches will be installed to provide emergency replacement of parts if necessary. There will be a welding bay for the repair of boxes and buckets and other welding jobs.

FUEL TRANSPORTATION AND STORAGE

Annual diesel fuel requirements are estimated to be 21.8 million litres per year. Diesel fuel will be transported from the south side of Great Slave Lake to the barge dock at the TLP. The planned NTCL barges have the capacity to haul 1 M litres per barge in holds within the hull. NTCL is equipped to load and transfer fuel at its Hay River base. Fuel will therefore be loaded at Hay River for transport to TLP. Given the need to make an additional run to Hay River for each fuel run, the delivery of fuel is based upon triple barges arriving with containers each carrying an additional one million litres of fuel within the hull. There will be seven fuel runs in a given season.

The fuel will be offloaded to a storage facility at the dock at GSL. This is a planned 4.5 M litre storage facility so that a complete barge load (3 barges) can be offloaded without disruption. The tank farm will be a lined bermed facility with three 15 m diameter by 10 m high tanks each capable of holding 1.5 M litres. The two tanks will be in a bermed area some 65 m long by 25 m wide (inside berm). The berm will be approximately 1.5 m high to generate a bermed storage volume of 110% of the largest tank plus 10% of the balance of the capacity.

Fuel deliveries are assumed to be spaced evenly through the shipping season. From the tank farm at the GSL dock the fuel will be transported by tandem axle fuel tanker to the main tank farm at the TLP facility.

MAIN FUEL STORAGE

A bermed fuel farm containing twelve 1.5 million litre capacity diesel fuel tanks will be provided along the main haul access road on the south side of the plant area. This will include a fuel load out from tankers and dispensing station for vehicles. Fuel dispensing will be monitored to provide suitable documentation related to the taxation of fuel in the different uses. The tank farm area will be lined with an impermeable liner and the berm will be large enough to contain the required quantity of fuel based upon storage regulations.

PARKING

A parking area for the units required for seasonal use will be made beside the cold storage area.

ACCOMMODATION, BUNKHOUSE AND CATERING

The accommodation will be pre-manufactured units which will be brought to the site and assembled into modules with sleeping quarters and wash trailers. A modular kitchen will also be brought in and set up to service the crews. Sea container refrigeration units will be used for cold storage and for coolers while regular containers will be used for canned and dry goods storage.

Garbage will be collected daily and incinerated. Recyclable materials will be collected separately and shipped out annually for processing. A waste management site will be established for the long term storage of waste materials.

SITE ROADS

Site roads will be required to access the following locations from the mill complex:

- Mine portal
- Mine fresh air raise and mine air heater
- Secondary mine exhaust raises (2)
- Tailings disposal area
- Water reclaim area
- Air strip
- Dock at GSL.

Site roads will be low speed single lane roads with turnouts to permit vehicles to meet. The road to the GSL dock will operate with radio communication so that vehicles can organize to use the turnouts and not be forced to back up. The GSL access road will have regularly spaced turn outs suitable for the concentrate and fuel trucks that will use the road.

ACCESS ROAD TLP TO DOCK

The heaviest use road will be the road to the GSL dock which will see regular use through the spring and summer and into the fall with the shipping of concentrate the resupply for the site.

There is an existing road that connects the TLP with the planned dock site at GSL. For the construction and mine operation the construction of some new sections of road will be required together with the upgrading of the access road so that it is in shape for regular use for the movement of containers, fuel and other supplies and equipment.

A new section of road approximately 800 m to 1,000 m long will be constructed so that the grade on the road to the dock facility is reduced to approximately 5%.

ANNUAL RESUPPLY

The safe barging season on GSL is a 90 day period in the summer. The logistics planning has been focused on completing the task in the minimum period possible to reduce the demurrage and standby costs related to barges and tugs. The current estimate is that the resupply could be completed in less than a month if all of the equipment and supplies are appropriately organized.

MILL SUPPLIES

The key flotation mill supplies are listed in the Table 18-2. Current testwork involves optimization and some changes may be expected in future studies.

TABLE 18-2 ANNUAL REAGENT NEEDS
Avalon Rare Metals Inc. – Thor Lake Project

	Supplied As Conc, %	State	Consumption at Supplied Conc, tpa
Ferric Chloride (FeCl_3)	98	Solid	167.6
Fluorosilicic Acid (H_2SiF_6)	24	Bulk Liquid	912.0
Flocculant (Magnaflow 156)	100	Solid	11.4
Sodium Hexametaphosphate (NaPO_3) ₆	98	Solid	149.0
Sodium Hydroxide (NaOH)	99	Solid	147.4
Sodium Silicate (Na_2SiO_3)	100	Solid	146.0
Sodium Sulphide (Na_2S)	60	Solid	1,216.0
Sulphuric Acid (H_2SO_4)	94	Bulk Liquid	77.8
KBX3:			
Flotator SM15 (1682)	100	Liquid	322.0
Aero 845	100	Bulk Liquid	191.6
Disponil SLS 101/103	30	Bulk Liquid	434.0
Witcomul 3251	100	Liquid	122.6
MLC3:			
Acumer 9400	43	Liquid	276.0
Rheosperse 3010	100	Bulk Liquid	118.8
Alginate Acid ($\text{C}_6\text{H}_8\text{O}_6$)	22	Solid	246.0
MX3:			
Oxalic Acid ($\text{C}_2\text{O}_2(\text{OH})_2$)	99	Solid	236.0
Citric Acid ($\text{C}_6\text{H}_8\text{O}_7$)	100	Solid	234.0
Lactic Acid ($\text{C}_3\text{H}_6\text{O}_3$)	88	Liquid	132.8
Tonnes per year			5,141.0

SURFACE EQUIPMENT

The surface equipment fleet at the TLP will be required for site services on a year round basis plus the seasonal demands of the annual concentrate shipment and resupply. The key units are listed in Table 18-3.

TABLE 18-3 SURFACE EQUIPMENT FLEET
Avalon Rare Metals Inc. – Thor Lake Project

Mill/Warehouse

Tool Handler	1	Freight Handling
Bobcat	1	Mill Clean Up
Reach Stacker	1	Concentrate Handling
Pick-up Truck	2	Tailings Inspection
HDPE Pipe Welder	1	Tailings Line
Boom Truck	1	Tailings Lines/Pumps
Electrician Vehicle	1	
966 Front-end Loader	1	Yard Work
Telehandler	1	Material Handling

Surface

Fuel Trucks	2	Fuel Haul
Tractor Units	3	Material and Concentrate Haul
Container Trailers	4	Container Moves
Flat Deck Trailer	1	General
Dump Truck	1	Roads
Snow Plow	1	Roads Yards
Excavator	1	General
Tractor Backhoe	1	General
Grader	1	Roads
Pick-up Truck	3	Garbage/Maintenance/Inspection
Service Truck	1	General
D-6 Dozer (D-8??)	1	Rock Work
Vibratory Packer		Road and Airstrip Work
Crushing/Screening Plant		

Dock

Crew Cab	1	Crew Transport
Pick-up Truck	1	Supervisor
Flat Deck Trailer	1	General
Work Boat	1	Water Work
Container Forklift	2	Containers

Management

Pick-up Truck	3	Management
Van For Crew	1	Crew Change
Cube Van	1	Luggage/Light Freight
Ambulance	1	
Fire Truck	1	
Spill Response	1	

DOCK FACILITY

The shore topography at the GSL about 8 km by road south of the mine site is generally rocky and steep. The requirements for a barge loading-unloading dock include a water

depth of about 3 metres near shore and the need for a large (~ 2-ha or more) flat-graded marshalling yard for fast unloading and loading using large fork trucks.

In the past, barge loads of fuel and equipment were brought in at a convenient bay from which the existing access road was constructed. A site reconnaissance concluded that this was also well suited for the permanent dock site.

TEMPORARY BARGE DOCK

As an alternative to the permanent sheet pile dock it is planned to use barges as the dock and annually bring in barges and dock them to shore as shown in Figure 18-3. This barge would then be the dock for access to the barges to be loaded and unloaded. This option is inexpensive and is expected to require less permitting effort. However, the barges will have to be unloaded one at a time and then reloaded one at a time which will increase the turnaround time and the amount of equipment required to attain the planned turnaround time. With the water depth at the Thor Lake site a single barge moored to land for the summer season may be sufficient to provide a suitable access to the barge trains that will be brought to the site.

The temporary barge dock would be brought in at the start of each season and removed at the end of the shipping season. Access to the docked barge would be a short fill ramp from the GSL yard.

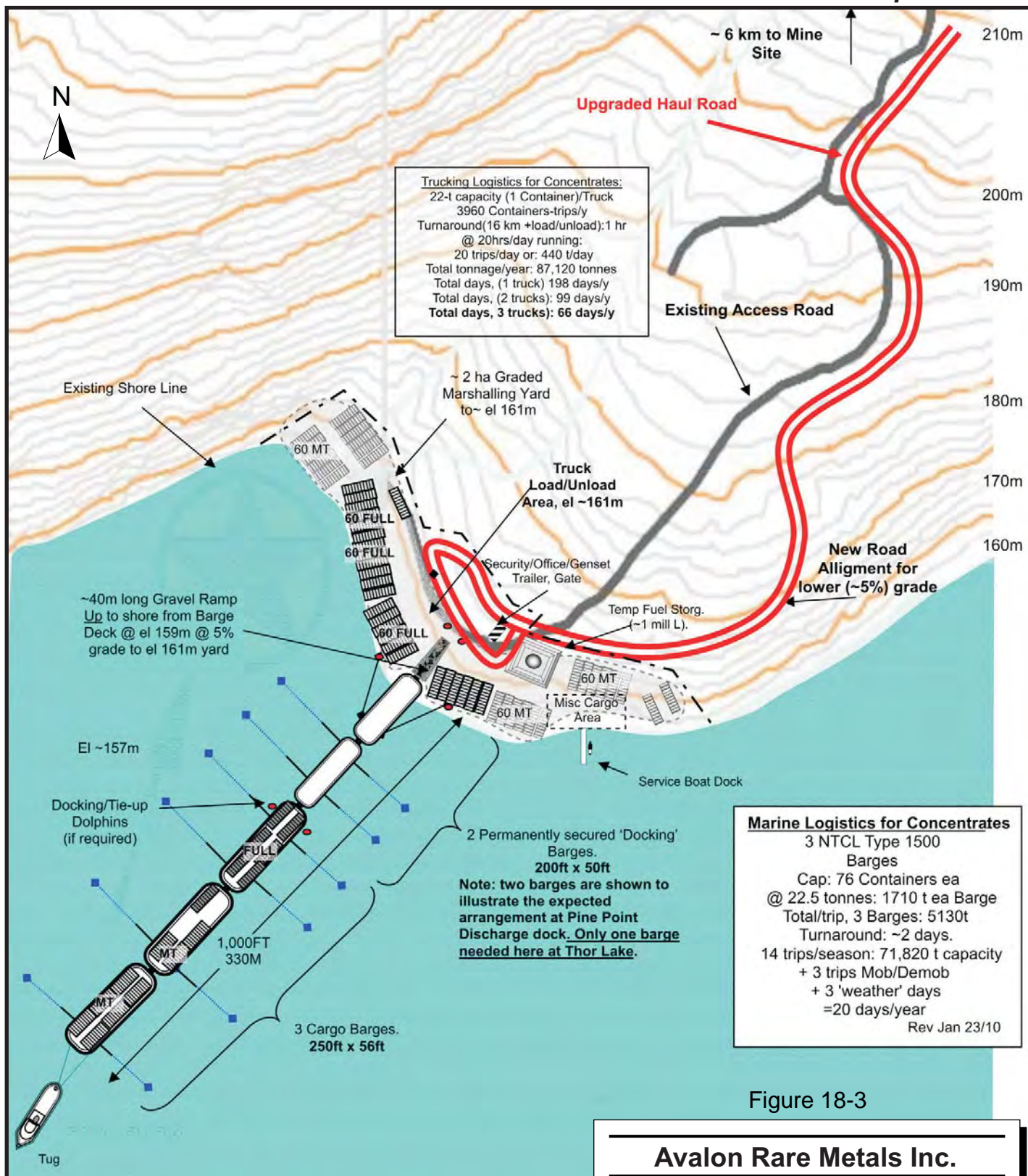


Figure 18-3

Avalon Rare Metals Inc.

Nechalacho Project
 Northwest Territories, Canada

Thor Lake
Temporary Barge Dock Option

DOCK YARD

The yard at the dock will require the development of a yard for the handling of materials as they are offloaded and loaded and for the transfer of containers between the Thor Lake site and the dock at GSL. At a minimum there will be:

- a 40 to 50 m long ramp to access the barge deck for loading and unloading barges
- a 45 m by 60 m (3 M L capacity) lined bermed fuel storage area
- a minimum 1,200 m² area for full containers (276 containers stacked 4 high)
- minimum 1,200 m² area for empty and returning containers
- parking area for intermodal freight and trucks
- Diesel pumps and piping for the transfer of fuel from the barges to the fuel storage tanks
- A receiving/security/ lunchroom facility
- Diesel generation to power fuel pumps and site services
- A small floating dock for the work boat

MATERIAL HANDLING

Container forklifts will be used to offload empty containers and load full containers. All annual supplies except diesel fuel and propane will arrive in similar ISO containers as those used for concentrate or in full size containers.

This design concept is based on the following barging cycle schedule:

- The arriving in 3 barges will be off-loaded and full (concentrate) containers will be loaded during 2 to 3 24-hr days after the tug with the last 3 barges in underway and off-loading at Hay River.
- On arrival of the '3-barge-train' with empty containers (including some supplies), the barges will be towed in to a temporary mooring near the fully loaded ones ready at the dock. Off-loading from at least one of the barges can then start immediately.
- The tug will then take the three full barges at the dock under tow and get underway to Hay River with the new full load.
- As soon as the tug has left with the load, the empty barges at the temporary mooring would be moved 'manually' with the aid of a dedicated small work boat and/or a land based tow-motor along the seawall to the dock moorings for loading.

- This cycle will repeat upon arrival of the next fully loaded 3-barge string.
- Together with the unloading logistics at NTCL's Hay River facility, these logistics will require a total of 9 barges and 1 tug dedicated to the project.

There will be container forklifts in service at the GSL dock to handle containers to and from the stacks of containers and onto and off of haul trucks moving containers to and from the Thor Lake site.

At the Thor Lake site, a container forklift will be used to off load trucks and stack containers. Containers inbound with materials will be stored separately so that control of the site materials can be maintained.

AIRSTRIP

The site has been serviced using float planes and ski planes and with rotary wing support over freeze up and break up. In 2010 the airstrip was developed into a 30.4 m wide by 305 m long strip to provide all year fixed wing service to the site. With the move to project construction the airstrip will be expanded to total length of 915 m.

The air strip will be suitable for medium sized aircraft for light freight and personnel movement. The airstrip is not planned to be lit for night operation. This will limit winter operations when the daylight hours are short but the most common connection will be with Yellowknife which is approximately 100 km from the site.

An apron will be installed complete with small concrete pads to reduce the potential damage to aircraft engines from small rocks that can be picked up by the propellers as the engines are run up prior to take off from the ramp.

SECURITY

In view of the remote nature of the site there is little risk to the general public and little risk of public access to the site. There will be occasional visitors in summer who will come to the dock site by boat. Such visitors will be met with signs and personnel who will explain that this is a private dock and site, that visitors are not allowed on site and that there are no services available at the site. There will not be a manned security station at any location on the site.

Where necessary, fencing will be installed to keep wildlife out of areas such as the reagent storage. The use of containers for storage will minimize the requirement for such fencing.

MEDICAL FACILITY

The medical facility at the site will consist of an appropriately supplied first aid station and there will be appropriately qualified first aid personnel on site and on call at all times. The first aid room will be located in the mine office complex area.

An ambulance will be available on site for the transport of injured personnel to the first aid stations and then on to the air strip. Seriously injured personnel will be evacuated from the site by air to Yellowknife. The ambulance will be a diesel powered unit and will be certified for operation within the underground mine.

A fire truck will be available on site to respond to surface fire incidents. The surface fire brigade will be a combination of personnel from the site.

Mine rescue gear will be purchased and located within a mine rescue training area in the office complex. Mine rescue personnel will be selected and trained as required under the Mine Safety Rules.

TAILINGS MANAGEMENT FACILITIES

THOR LAKE TAILINGS MANAGEMENT FACILITY

GENERAL

The tailings management facility design was prepared by Knight Piésold for the PFS. The design basis and criteria for the Tailings Management Facility (TMF) are based on Canadian standards for the design of dams. In particular, all aspects of the design of the TMF have been completed in compliance with the following documents:

- Canadian Dam Association (CDA) Dam Safety Guidelines (CDA 2007)
- The Mining Association of Canada (MAC) Guide to the Management of Tailings Facilities (MAC 1998)

The principal objective of the TMF design is to ensure protection of the environment during operations and in the long-term (after closure) and achieve effective reclamation

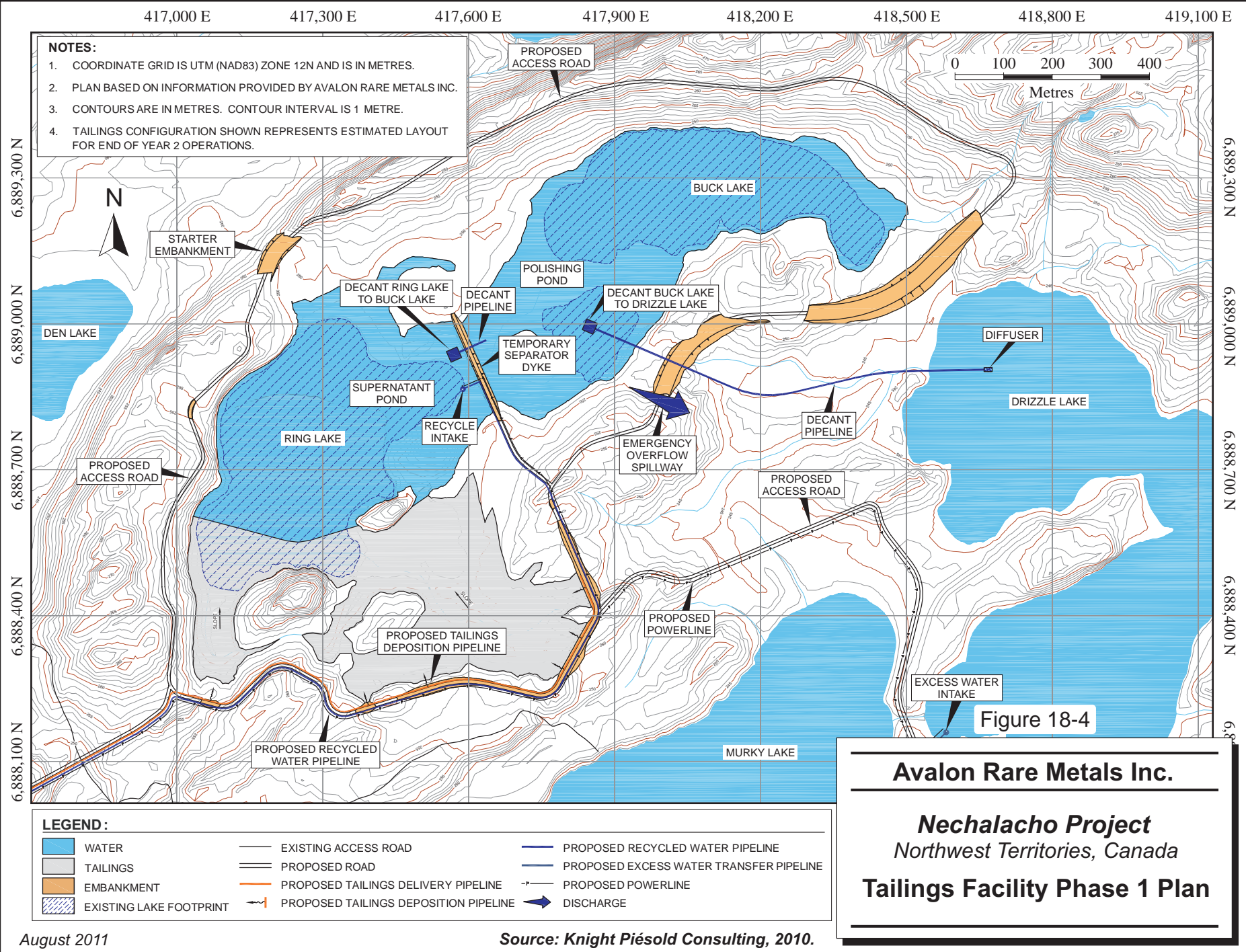
at mine closure. The pre-feasibility design of the TMF has taken into account the following requirements:

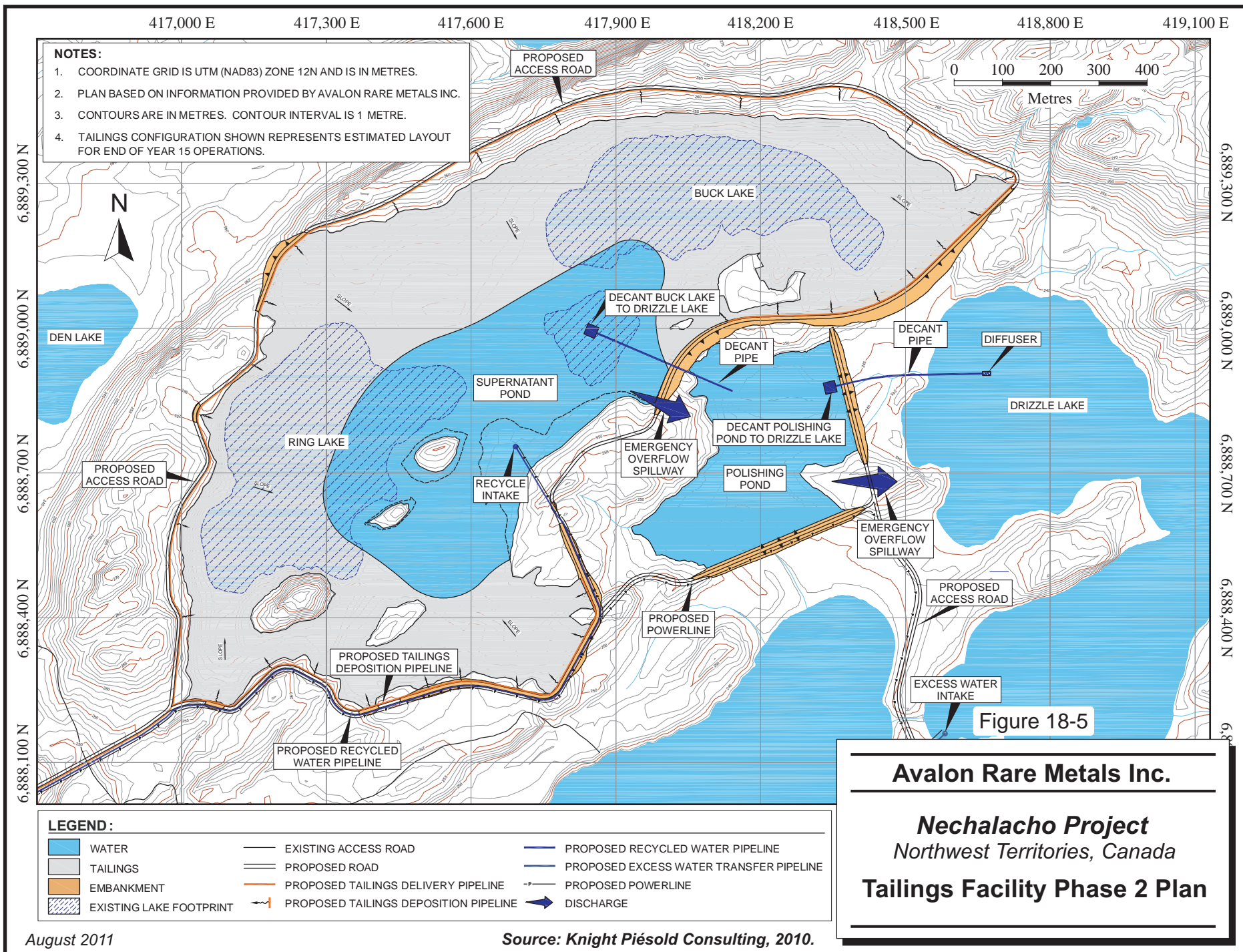
- Permanent, secure and total confinement of all tailings solids within an engineered facility
- Control, collection and removal of free draining liquids from the tailings during operations, for recycling as process water to the maximum practical extent
- The inclusion of monitoring features for all aspects of the facility to ensure performance goals are achieved and design criteria and assumptions are met

The TMF design includes a Phase 1 and Phase 2 configuration that is raised and expanded in an ongoing manner throughout the mine life, Figures 18-4 and 18-5, respectively. This offers a number of advantages as follows:

- The ability to reduce capital costs and defer some capital expenditures until the mine is operating.
- The ability to refine design and construction methodologies as experience is gained with local conditions and constraints.
- The ability to adjust at a future date to remain current with “state-of-the-art” engineering and environmental practices, etc.
- To allow the observational approach to be utilized in the ongoing design, construction, and operation of the facility. The observational approach is a powerful technique that can deliver substantial cost savings and high level of safety. It also enhances knowledge and understanding of the site-specific conditions. For this method to be applicable, the character of the project must be such that it can be altered during construction (Peck, 1969).

The construction will be scheduled to ensure that there is always sufficient storage capacity available in the facility to avoid overtopping. The embankment raising schedule provides sufficient freeboard to safely accommodate the supernatant pond and Environmental Design Storm event, combined with wave run-up. A spillway is included to pass the Inflow Design Flood event.





TAILINGS AND WATER MANAGEMENT

The tailings and water management strategy for the Thor Lake pre-feasibility design consists of a closed loop system to minimize impact to the natural hydrologic flows within the Thor Lake watershed area. All tailings solids and fluids as well as impacted water from the Process Plant will report to the Tailings Basin. The TMF design currently proposed includes a Polishing Pond. Excess water from the Tailings Basin will be treated (if necessary) and discharged from the Polishing Pond to Drizzle Lake. Ultimately, all water from the TMF will return to Thor Lake via Drizzle and Murky Lakes. Fresh water for operations will be drawn from Thor Lake and reclaim water will be drawn from the Tailings Basin. The pre-feasibility water balance has assumed that the process water feed to the Process Plant will consist of 50% fresh water and 50% recycled water from the Tailings Basin.

Decant pipeworks have been included in the pre-feasibility design to transfer water from the Tailings Basin supernatant pond to the Polishing Pond in Phases 1 and 2, and to transfer water from the Polishing Pond to Drizzle Lake. As a contingency for impact mitigation, a decant intake and pipeline has also been included to transfer excess water from Drizzle Lake to Thor Lake. The decant pipeworks have been included to provide operational flexibility and maintain water volumes in each water body. The water balance has indicated that during the later years of operation the water volume in Thor Lake could potentially be drawn down greater than 5% exceeding the DFO Winter Withdrawal protocol. This can be mitigated by increasing the reclaim rate from the Tailings Basin or alternatively using the Cressy Lake basin as an additional fresh water supply in the winter months.

CAPACITY AND FREEBOARD REQUIREMENTS

The capacity of the TMF is based on the topographic contours, the embankment configuration and the projected process plant throughput rates. The TMF capacity and freeboard have been designed based on the following key points:

- Storage of 2.9 million m³ of tailings at a settled dry density of 1.2 t/m³
- Storage of up to 1.2 million m³ of water and ice
- Containment of the 1 in 25 year 24-hour Environmental Design Storm (EDS) event (46 mm)
- Minimum freeboard of 2.0 m for wave run-up and routing of the Inflow Design Storm (IDS)
- Overflow spillway to convey the IDS

TAILINGS DELIVERY AND DISTRIBUTION

Tailings will be pumped from the Process Plant to the Tailings Basin via a tailings delivery pipeline to the south west corner of the Tailings Basin. Tailings deposition to the basin will consist of single end-of-pipe discharge from the tailings deposition pipeline to reduce icing concerns during the winter months. Before paste filling of stopes begins, 100% of the tailings solids will be pumped to the Tailings Basin at a slurry consistency of 14.4% solids. During paste fill activities, 50% of the tailings solids will be used for mine backfill and the remainder of the tailings solids will be pumped to the Tailings Basin at a reduced slurry consistency of 7.2% solids.

Tailings deposition to the basin will occur from several locations along the south end of Ring Lake. Tailings discharge will be rotated between deposition locations to develop a relatively flat tailings beach sloping towards the north and to maintain a supernatant pond in northern portion of Ring Lake. A temporary separator dyke will be constructed between Ring and Buck Lakes to keep tailings solids in Ring Lake and allow Buck Lake to be initially operated as a polishing pond.

During expansion, the tailings discharge pipeline will be extended around Ring and Buck Lakes. Additional discharge locations will be installed around the perimeter of the Tailings Basin and tailings deposition will be rotated between outlet locations to develop a flat tailings beach around the facility and maintain a supernatant pond in the central portion of the Tailings Basin. A Polishing Pond will be constructed at the southeast side of the Tailings Basin if monitoring and testwork completed during initial operations indicate that it is required.

OPERATIONS AND MONITORING

Proper operations, monitoring and record keeping are a critical part of any waste or water management facility. For the TMF, the requirements for proper operation and monitoring of the facility will be active and ongoing. Operations of the TMF will require full-time personnel, dedicated to managing the facility.

Before and during construction, an Operation, Maintenance and Surveillance (OMS) Manual will be developed for the TMF.

PINE POINT INFRASTRUCTURE

PROCESS FACILITY SITE

In addition to the process facility there will be a requirement for:

- Administration Offices
- Dry and lunch room
- Warehouse
- Shops
- Assay/Metallurgical Lab
- Reagent storage, mixing tanks
- Container storage area

ACCESS ROADS

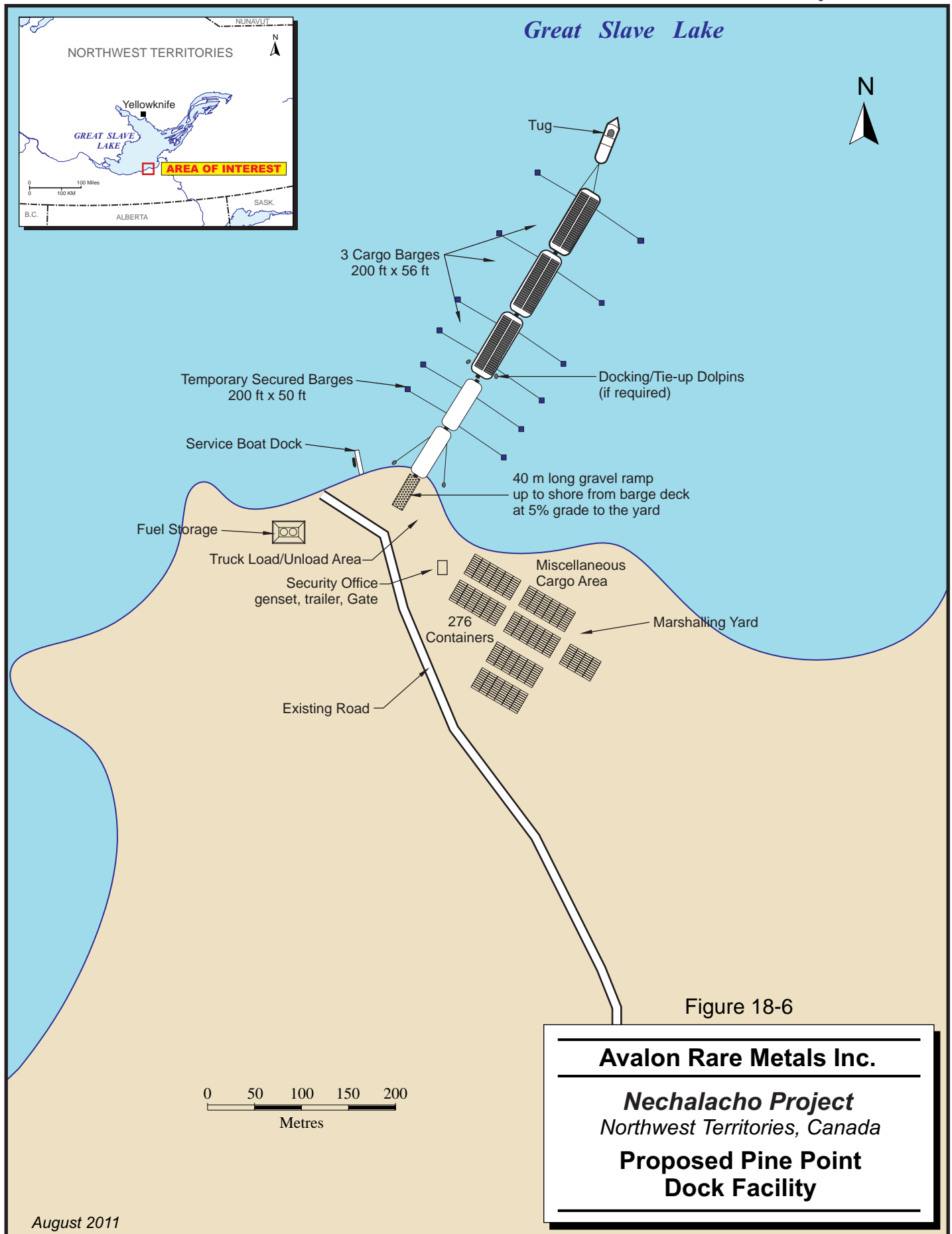
The hydrometallurgical plant is to be located in an old borrow pit located on the east side of the tailings facility. There is a network of roads that connect the plant site to the main access roads but it will be necessary to upgrade short sections of the road for plant access.

There is an existing 7.5 km long light use road that connects the Pine Point road network to the site of the proposed dock which is the former fresh water reclaim area. For the plant operations it will be necessary to upgrade the road to the lake from the Pine Point site so that it is suitable for the movement of heavy trucks with supplies and concentrate.

Site access roads will be developed to access the Pine Point plant and storage areas and to connect to the dock site at GSL. With the location of facilities near previously existing commercial sites it is assumed that road construction will not be a significant issue in the Pine Point area.

DOCK FACILITY

A temporary dock will be installed annually at the Pine Point landing site. Two barges tied end to end will serve as the dock. These barges would then be the dock for access to the barges to be loaded and unloaded. This option is inexpensive and is expected to require less permitting effort, however, outgoing and incoming barges will have to be unloaded one at a time and then reloaded one at a time which will increase the turnaround time and the amount of equipment required to attain the planned turnaround time. Figure 18-6 shows the proposed Pine Point dock facility on Great Slave Lake.



DOCK YARD

The yard at the dock will require the development of a yard for the handling of materials as they are offloaded and loaded and for the transfer of containers between the Pine Point plant and the dock at GSL. At a minimum there will be:

- a 40 m to 50 m long ramp to access the barge deck for loading and unloading barges
- a minimum 4,800 m² area for full containers (276 containers stacked single height)
- a minimum 4,800 m² area for empty and returning containers
- a parking area for intermodal freight and trucks
- a small office and lunch room
- a small float to serve as a work boat dock

The area is generally flat but the subsurface materials can be mud and swamp. If ground conditions are good a larger yard can be established at the southern GSL barge terminus. If soil conditions are poor then a smaller yard will be built and materials will be moved to and from the barge dock on a load by load basis.

MATERIAL HANDLING

Materials will be handled in the same manner as described for the Thor Lake site.

CONCENTRATE HANDLING

Concentrate will arrive from the TLP in containers from the annual sealift over the summer season. The first containers would be expected to arrive commencing in late July with ongoing arrival over a one month period. The containers will be unloaded to a storage facility immediately adjacent to the dock at Pine Point before being shipped by truck to the process facility at Pine Point. Facilities for the thawing of concentrate containers will be installed at Pine Point. The shipment of concentrate in closed containers eliminates the risks of dusting and is expected to reduce the potential for loss of concentrate during transportation.

POWER

The planned installed electrical load at the Pine Point facility is 11.4 MW broken down as shown in Table 18-4.

TABLE 18-4 HYDROMETALLURGICAL PLANT ELECTRICAL LOAD
Avalon Rare Metals Inc. – Thor Lake Project

		2,000 tpd
Installed Electrical Equipment		
Acid plant	kW	3,000
Hydromet	kW	7,478
Lime kiln and slaking	kW	400
Limestone grinding	kW	500
Total Installed	kW	11,378
Estimated Operating Electrical Load		
Acid plant	kW	2,115
Hydromet	kW	4,487
Lime kiln and slaking	kW	260
Limestone grinding	kW	450
Total Power Draw	kW	7,312
Energy Use	MW-hrs/a	55,435

The power cost estimates are based upon the supply of 6 MW of electrical power from the grid in one quarter of a year and the provision of up to 9 MW of electrical power from the grid in the other three quarters of the year. Diesel generation of 1.3 MW will be required in one quarter of a year at the 2,000 tpd rate. Electrical energy is available at the substation with that power coming from the NWT Energy grid from the Taltson dam in the southern NWT.

SURFACE MOBILE EQUIPMENT

The surface mobile equipment at the Pine Point site will be required to support the operation. In light of the potential to hire local equipment from Fort Resolution, Hay River or other local area communities it will not be necessary to be completely self sufficient as at the TLP.

A list of the surface mobile equipment for the Pine Point site is show in Table 18-5.

AIRSTrip AT PINE POINT

When Pine Point Mines was in operation there was an airstrip that was in service near the town. This strip is no longer available for use and it is not planned for rehabilitation in this study.

TABLE 18-5 SURFACE MOBILE EQUIPMENT AT PINE POINT
Avalon Rare Metals Inc. – Thor Lake Project

Mill/Warehouse		
Tool Handler	1	Freight Handling
Bobcat	1	Mill Clean-up
Pick-up Truck	2	Tailings Inspection
HDPE Pipe Welder	1	Tailings Line
Boom Truck	1	Tailings Lines/Pumps
Electrician's Vehicle	1	
966-size Front End Loader	1	Yard Work
Zoom Boom	1	Material Handling
Surface		
Tractor Units	3	Material and Concentrate Haul
Container Trailers	4	Container Moves
Flat Deck Trailer	1	General
Dump Truck	1	Roads
Snow Plow	1	Roads/Yards
Excavator	1	General
Tractor Backhoe	1	General
Grader	1	Roads
Pick-up Truck	2	Garbage/Maintenance/Inspections
Service Truck	1	General
Dock		
Crew Cab	1	Crew Transport
Pick-up Truck	1	Supervisor
Flat Deck Trailer	1	General
Work Boat	1	Water Works
Container Forklift	3	Containers
Management		
Pick-up Truck	3	Management
Van for Crew	1	Crew Change
Ambulance	1	
Fire Truck	1	
Spill Response	1	

MEDICAL FACILITIES

The Pine Point site will be equipped with a first station with qualified first aid personnel on site and on call whenever the plant is operating. An ambulance will be stationed in Pine Point to reduce the travel time to medical attention in Hay River.

SHIPPING OF PRODUCTS

The products from the plant are planned to be shipped to a loading yard alongside the CN rail line immediately south of Hay River after which the products will be loaded into box cars for transport. Products will be packaged in drums or in one tonne totes so that they can be easily handled.

FRESH WATER FOR PROCESSING

Fresh water to be used in the Hydrometallurgical Plant is proposed to be taken from the T-37 historic open pit where the water table associated with the Presqu'île groundwater aquifer is exposed

PINE POINT TAILINGS MANAGEMENT FACILITY

For the UPFS, the tailings disposal option at Pine Point has been changed to use one of the existing open pits. The change was made based upon the cost of the lined facility atop the existing tailings and concerns related to potential impacts upon the existing tailings.

Tailings produced in the plant will be pumped to the L-37 historic pit, which will act as the Hydrometallurgical Tailings Facility (HTF) for contained disposal. Excess water from the supernatant pond will be pumped to the nearby N-42 historic pit for infiltration into the Presqu'île aquifer.

The L-37 pit was reportedly mined to exploit a 3.4 million tonne tabular deposit approximately 900 m long by 375 m wide by 4 m to 12 m thick. The pit has a depth of 28 m. The N-42 pit was mined to exploit a 3 million tonne deposit approximately 490 m long and 180 m wide.

The L-37 pit has been selected as the HTF for several reasons:

- Proximity to the Hydrometallurgical Plant Site
- Limited free water/groundwater exposed in the pit
- Availability of local till and waste rock sources nearby
- No evidence that historic pit was used for other types of waste disposal
- Volume of pit is projected to be sufficient to contain all tailings solids and the proposed maximum supernatant water pond

An updated design basis memo was issued (KPL Memo NB11-00102) which summarizes the process flow information for the Hydrometallurgical Plant, given the proposed acid-bake method. This information was used to determine the volume of tailings and process water expected to be produced over the operational life. The cumulative volume of solids and water for Years 2 and 20 (ultimate case) were modeled in the L-37 pit as shown on Figures 18-7 and 18-8, respectively.

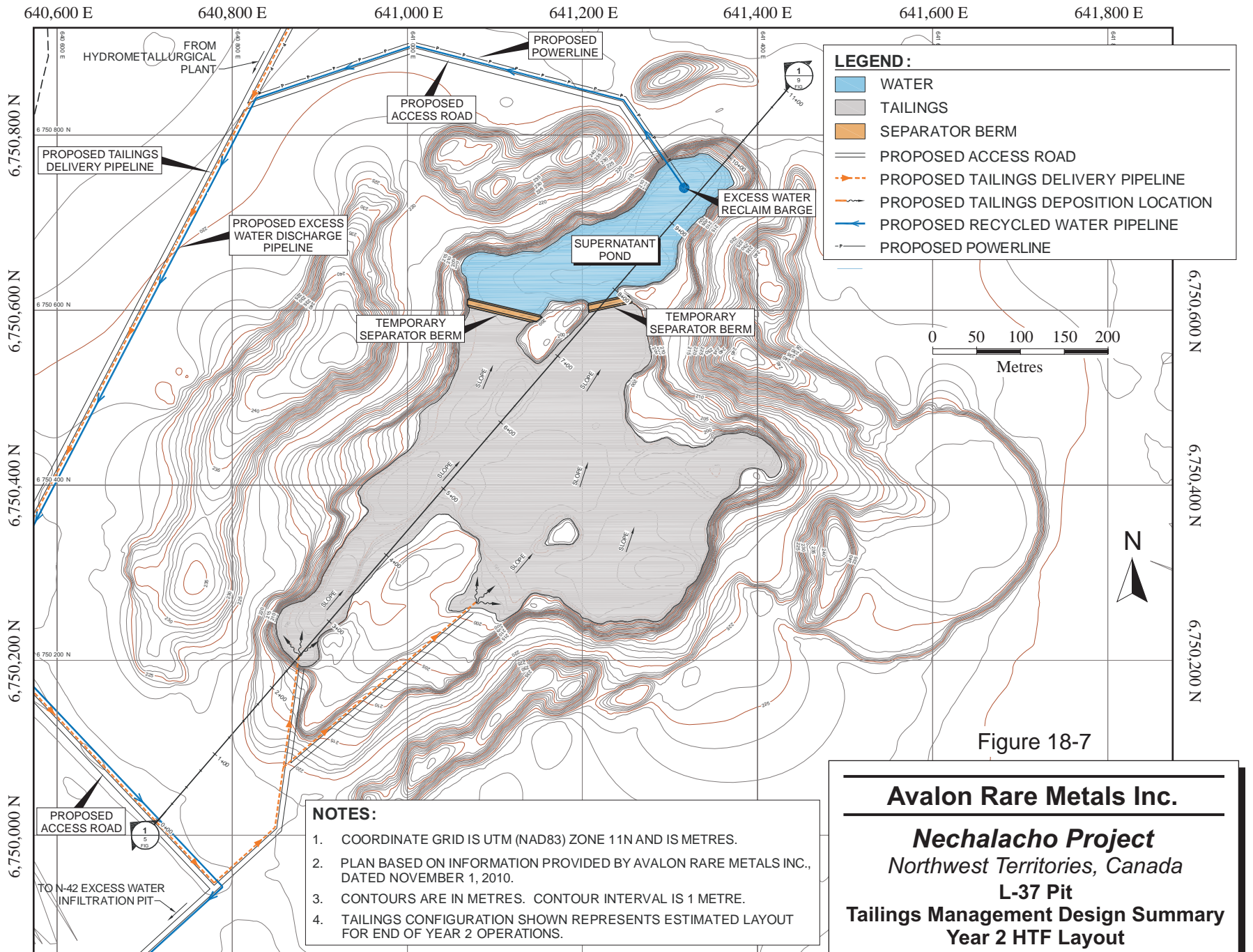
A section through the HTF that shows the pit at these filling stages is shown on Figure 18-9. As shown, the Year 20 (ultimate) tailings and supernatant water will be contained within the L-37 pit without the need for external embankment construction.

Prior to using the L-37 pit for tailings storage, preparation of the pit may be necessary. It is recommended that a detailed site investigation program, which may include surface mapping, test pitting, drilling, in-situ testing and/or laboratory testing, be completed in order to evaluate the extent of preparation required. The host bedrock for the pit is a permeable, sedimentary dolomite with documented instances of karst. It is important that the pit walls and floor be investigated so that any potential migration pathways for tailings solids/slimes are identified, if present. This site investigation program will determine locations, if any, for placement of select material to act as a filter/barrier to prevent the potential migration of tailings solids from the L-37 pit into the surrounding rock.

Prior to tailings deposition into the pit, it is currently proposed (if required) that the floor and walls of the L-37 pit be prepared, through the placement of a separation/filter barrier using locally available materials (i.e. till and/or processed waste rock). This barrier would prevent migration of the fine tailings solids into the highly porous and fractured bedrock that hosts the Presqu'île aquifer.

It is currently proposed that tailings deposition be carried out from the southern side of the pit and a temporary separator dyke be established near the northern side of the pit

for the initial years, as shown on Figure 18-9. This dyke would allow separation of the water from the tailings and if required, the area containing the supernatant could be lined in the event that water quality testing is required prior to allowing uncontrolled infiltration of the supernatant water into the aquifer. The northward sloping tailings will cover the remainder of the pit bottom and ensure that the supernatant pond remains at the northern side of the pit over the life of the facility, to allow for successful reclaim of excess supernatant water to be sent to the N-42 infiltration pit.



Avalon Rare Metals Inc.

Nechalacho Project

Northwest Territories, Canada

L-37 Pit

**Tailings Management Design Summary
Year 2 HTF Layout**

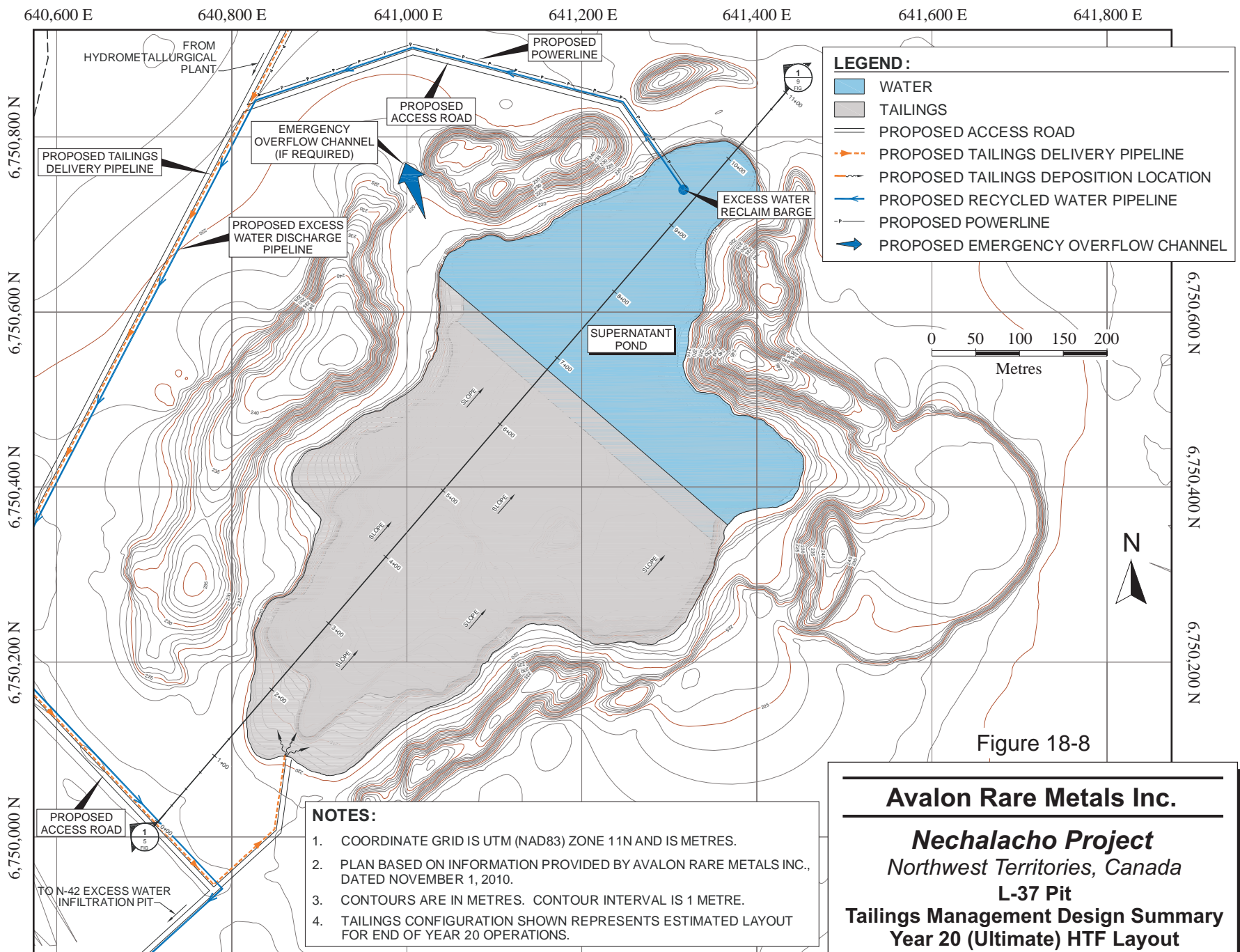


Figure 18-8

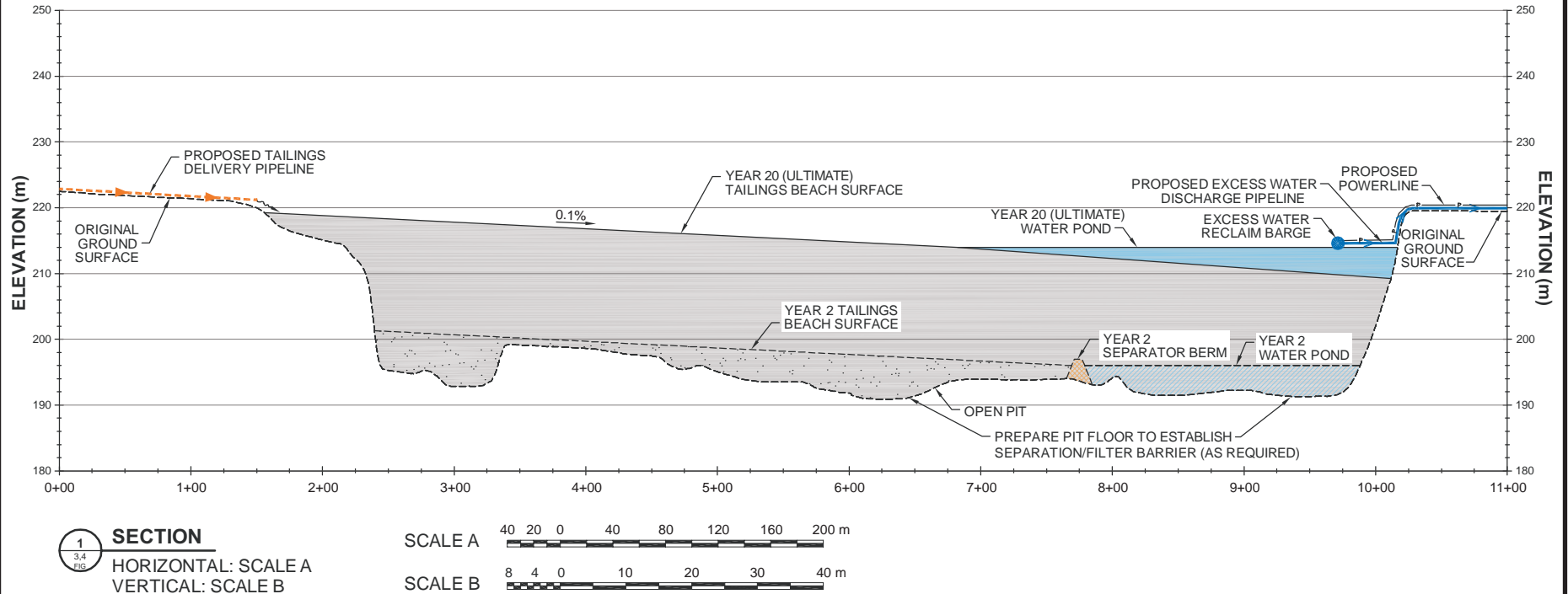
Avalon Rare Metals Inc.

Nechalacho Project

Northwest Territories, Canada

L-37 Pit

**Tailings Management Design Summary
Year 20 (Ultimate) HTF Layout**



NOTES:

- ELEVATIONS ARE IN METRES.

LEGEND:

- WATER (YEAR 20) ULTIMATE
- WATER (YEAR 2)
- TAILINGS (YEAR 20) ULTIMATE
- TAILINGS (YEAR 2)
- SEPARATOR BERM (YEAR 2)
- PROPOSED TAILINGS DELIVERY PIPELINE (ULTIMATE)
- PROPOSED TAILINGS DEPOSITION LOCATION (ULTIMATE)
- PROPOSED RECYCLED WATER PIPELINE (ULTIMATE)
- PROPOSED POWERLINE (ULTIMATE)

Figure 18-9

Avalon Rare Metals Inc.

Nechalacho Project

Northwest Territories, Canada

L-37 Pit

**Tailings Management Design Summary
HTF Section**

19 MARKET STUDIES AND CONTRACTS

MARKETS

Avalon collected historical price information, supply/demand analysis, and forecasts for the future. The sources of price information include the websites of Metal-Pages™ and Asian Metal, reports by BCC Research (BCC) and Roskill, a Canadian Imperial Bank of Commerce (CIBC) March 2011 forecast, analysis by TD Newcrest, verbal communication with Kaz Machida, a metal trader in the Japanese market, and private reports to Avalon by Industrial Minerals Company of Australia Pty Ltd (IMCOA), authored by Dudley Kingsnorth.

RARE EARTH SUPPLY

Rare earths are found in more than 200 minerals, of which about a third contain significant concentrations. Only a handful, however, have potential commercial interest. The most important source minerals are carbonates (bastnaesite) and the phosphates (monazite and xenotime). Apatite is also an important source of rare earths, while heavy rare earths are more commonly found in minerals in granitic and alkaline rocks and in ionic clays. The main geological environments for rare earths are:

- Carbonatites – bastnasite (Mountain Pass, California; Kola Peninsula; Russia, Sichuan, China)
- Monazite and xenotime-bearing placers (west coast of Australia; east coast of India)
- Iron-bastnaesite rare earth element deposits (Bayan Obo, Inner Mongolia; Olympic Dam, Australia)
- Ion absorption clays (Longnan, Jiangxi, China)
- loparite and eudialyte in alkaline intrusives (Kola Peninsula, Russia; Dubbo, Australia)
- Pegmatites, hydrothermal quartz and fluorite veins (Northern Territories, Australia; Karonge, Burundi; Naboomspruit, South Africa)

Other generic types which may contain rare earths are:

- Phosphates (Phosphoria Formation, western USA),

- Uranium deposits in sandstone and black shales (Wheeler River, Alberta; Williston Basin, Saskatchewan),
- Mylonites in limestones (Nam-Nam-Xe, Vietnam),
- Scheelite skarns (Ingichke, Uzbekistan),
- Nickel deposits (Sudbury Basin, Ontario).

By far the most important of current sources are the Bayan Obo iron rare earth deposits near Baotou, Inner Mongolia, the bastnaesite deposits in Sichuan, China and the ionic clay deposits in southern China. China is the dominant source of all rare earth oxides, accounting for approximately 97% of world production in 2009. Light rare earths are primarily produced in northern China (Inner Mongolia) and south-western China (Sichuan). The heavy rare earths are primarily produced in southern China (Guangdong), from ionic clays.

There are distinct differences in the elemental composition of various rare earth sources, as illustrated in Table 19-1.

As a consequence of the mix of the individual elements within a raw material source, the distribution of supply of the individual elements does not match the distribution of demand for the elements. The mixed composition of rare earth minerals necessitates the production of all of the elements within a given ore source. Such production does not necessarily equal the demand for the individual oxides, leaving some in excess supply and others in deficit. Overall production of rare earths on an oxide basis is therefore typically greater than the sum of demand for the individual elements in any given year.

TABLE 19-1 DISTRIBUTION OF RARE EARTHS BY SOURCE – CHINA
Avalon Rare Metals Inc. – Thor Lake Project

Source	Baotou, Inner Mongolia	Sichuan	Guangdong	Longnan, Jiangxi	Mountain Pass, Ca	Mt. Weld, W. Australia ¹
Ore Type	Bastnaesite Concentrate	Bastnaesite Concentrate	High-Eu clay	High-Y clay	Bastnaesite	Monazite
TREO in Concentrate²	50%	50%	92%	95%		
Element						
La	23	29.2	30.4	2.1	33.2	25.5
Ce	50.1	50.3	1.9	0.2	49.1	46.74
Pr	5	4.6	6.6	0.8	4.34	5.32
Nd	18	13	24.4	4.5	12	18.5
Sm	1.6	1.5	5.2	5	0.789	2.27
Eu	0.2	0.2	0.7	0.1	0.118	0.44
Gd	0.8	0.5	4.8	7.2	0.166	1
Tb	0.3	0	0.6	1	0.0159	0.07
Dy	0	0.2	3.6	7.2	0.0312	0.12
Er	0	0	1.8	4	0.0035	0.1
Y	0.2	0.5	20	62	0.0913	trace
Ho-Tm-Yb-Lu	0.8	0	0	5.9	0.0067	trace
Total TREO	100	100	100	100	99.9	100

¹Central Zone pit assays for La, Ce, Pr, Nd, Sm, Dy, Eu, and Tb

²TREO contents of China clays represent the relative amounts in concentrate produced from the clay deposits

Source: Neo-Materials International, Harben, Lynas Corp.

The Chinese government has instituted new regulations affecting licensing of rare earth production and is actively engaged in consolidation of the industry by major state-owned companies. Production licence quotas for concentrate have been reduced, and export quotas for both rare earth concentrates and finished products have been cut back several times in recent years. The reduction in export quotas is anticipated to continue as the Chinese authorities seek to promote domestic value-added rare earth production, at the expense of exports of concentrates and unprocessed metal and oxides. These supply limitations have exerted considerable upward pressure on rare earth prices for non-Chinese consumers.

The Chinese government is also actively engaged in supporting the consolidation of the rare earth industry, especially with respect to crude ore supply from illegal mining. Inner

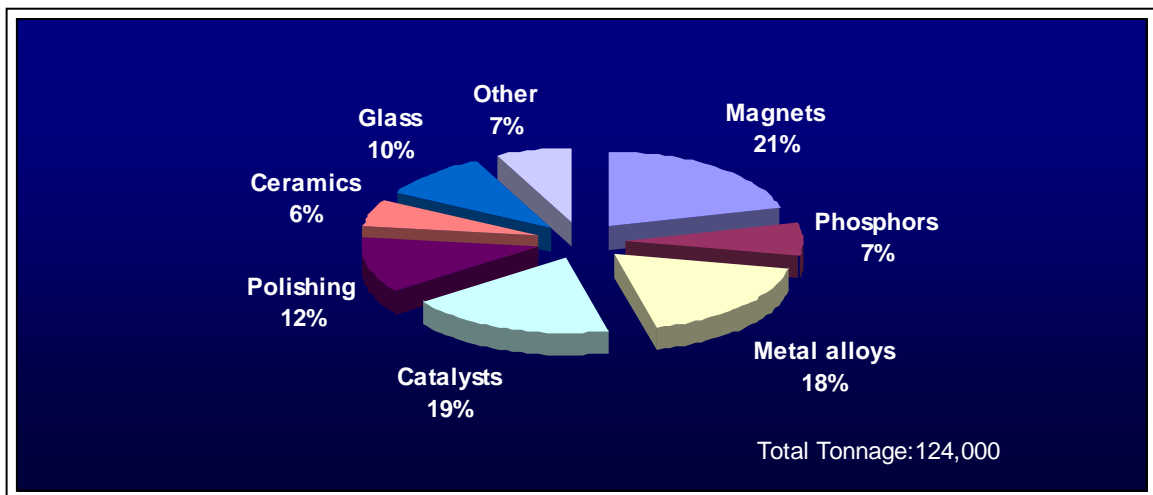
Mongolia Baotou Steel Rare Earth Hi-tech Company has taken effective control of mining and concentrate production of rare earths in Inner Mongolia, as has Jiangxi Copper at Mianning, Sichuan (although some illegal mining activity continues in Sichuan). China Minmetals Corporation has been consolidating control of rare earth production from the ionic clay deposits in Jiangxi Province, and the provincial authorities in Guangdong are encouraging consolidation of production. Chinalco has also become involved in the consolidation of the rare earth industry in Jiangxi. Control of production in the other rare earth producing provinces of Guangdong, Hunan, Fujian and Guangxi is currently less effective, but may be expected to improve over the next few years.

Overall, it is anticipated that supply of rare earths from China will be constrained over the forecast horizon of 2014 to 2015, with little to no increase in available supply from China. Accordingly, increases in supply will primarily have to be met from non-Chinese sources.

RARE EARTH DEMAND

Estimates of demand for rare earths by end use application are detailed in Figure 19-1 and Table 19-2:

FIGURE 19-1 RARE EARTH DEMAND BY END USE APPLICATION



Source: Industrial Minerals Company of Australia Pty Ltd. (IMCOA, 2008)

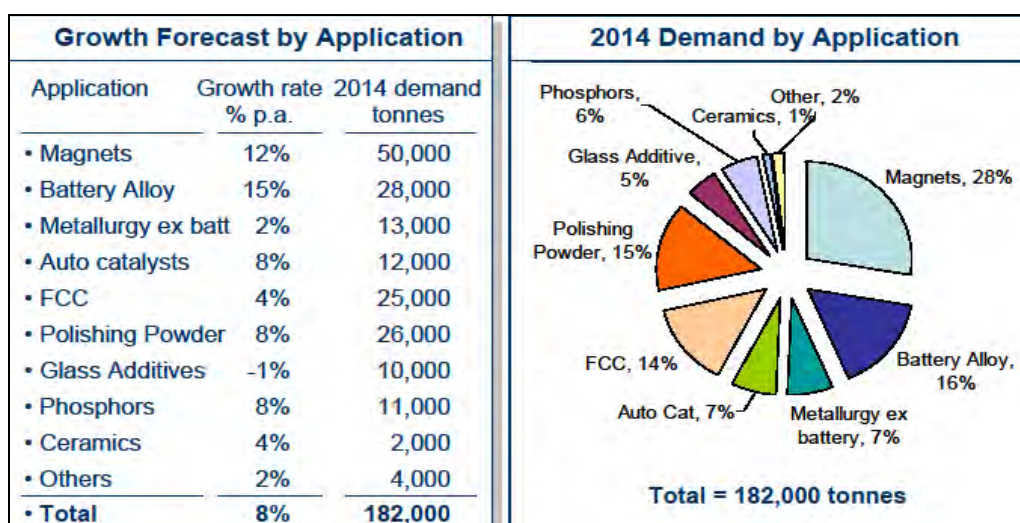
TABLE 19-2 RARE EARTH DEMAND BY APPLICATION AND REGION
Avalon Rare Metals Inc. – Thor Lake Project

Application	China	Japan & NE Asia	USA	Others	Total
Catalysts	7,000	2,000	12,500	1,500	23,000
Glass	8,000	2,000	1,000	1,500	12,500
Polishing	8,000	4,500	1,000	1,500	15,000
Metal Alloys	16,000	4,500	1,250	1,000	22,500
Magnets	21,000	3,500	750	1,000	26,500
Phosphors	5,500	2,500	500	500	9,000
Ceramics	2,500	2,500	1,250	750	7,000
Other	6,000	2,000	250	250	8,500
Total	74,000	23,500	18,500	8,000	124,000

Source: IMCOA, 2008 (estimates $\pm 10\%$ accuracy)

The projected demand for rare earths by application in 2014 is illustrated in Figure 19-2.

FIGURE 19-2 FORECAST REO DEMAND BY APPLICATION



Source: Roskill Information Services, Lynas, IMCOA,

By the end of the forecast period, the overall supply of rare earths is expected to exceed the demand of the individual elements due to co-production requirements, resulting in an excess of some rare earth oxides and a shortage of others, primarily some of the heavy rare earths.

Estimates for TREO future demand suggest - 180,000 tonnes by 2012; 180,000 to 200,000 tonnes by 2014, and 205,000 to 225,000 tonnes by 2015. At current production levels, some observers expect that world demand will exceed supply of some REE by 40,000 t by 2015. By 2015, some expect China could produce 175,000 tonnes of TREO, and any gap in demand would have to be filled by new producers.

The Thor Lake Project is anticipated to produce 7,000 tonnes to 9,000 tonnes per year.

Supply projections include provision for new, non-Chinese suppliers from a number of advanced projects, some of which are shown in Table 19-3.

Based on anticipated REO product mixes from these projects, it is likely that a supply shortfall in many of the more critical rare earths, as detailed in Table 19-4, is likely to emerge by 2014, which is expected to lead to higher prices.

TABLE 19-3 PROPOSED NEW REO PROJECTS (EX AVALON) 2010 – 2014

Avalon Rare Metals Inc. – Thor Lake Project

Company	Project	Location	Target Start	Capacity (t REO)	Product Focus
Molycorp	Mountain Pass	USA	2012	20,000	La, Ce, Nd, Pr
Lynas Corp.	Mt. Weld	Australia	2011	11,000	La, Ce, Nd, Pr, Sm
Alkane Resources	Dubbo	Australia	2014	2,500	La, Ce, Y, Nd, Pr
Vincamin	Dong Pao	Vietnam	2011	6,000 - 7,000	LREE
Neo Materials/Mitsubishi	Pitinga	Brazil	2012 or later	?	HREE
Great Western Minerals	Steenkampskraal	South Africa	2014	2,500	LREE
Toyota	Orissa	India	2011	7,000	LREE

TABLE 19-4 SUPPLY AND DEMAND FOR RARE EARTHS 2014 – 2015
Avalon Rare Metals Inc. – Thor Lake Project

Rare Earth Oxide	2014			2015		
	Supply (t of REO)	Demand (t of REO)	Surplus/Shortage (t REO)	Supply (t of REO)	Demand (t of REO)	Surplus/Shortage (t REO)
Lanthanum	54,750	51,000	3,750	60,700	59,250	1,450
Cerium	81,750	65,750	16,000	90,900	69,425	21,475
Praseodymium	10,000	7,900	2,100	10,900	9,750	1,150
Neodymium	33,000	34,900	-1,900	36,600	37,000	-400
Samarium	4,000	1,390	2,610	4,500	1,350	3,150
Europium	850	840	10	925	925	-
Gadolinium	3,000	2,300	700	3,400	2,575	825
Terbium	350	590	-240	375	480	-105
Dysprosium	1,750	2,040	-290	1,950	2,450	-500
Erbium	1,000	940	60	1,050	1,075	-25
Yttrium	11,750	12,100	-350	12,300	12,500	-200
Ho-Tm-Yb-Lu	1,300	200	1,100	1,400	220	1,180
Total	203,500	180,000		225,000	197,000	

Source: IMCOA

RARE EARTH ELEMENT PRICING

The market for rare earths products is small, and public pricing information, forecasts, and refining terms are difficult to obtain. The pricing methodology used for the PFS was updated, and compared to independent third-party forecasts.

PRICES IN CHINA

Historical REE prices in China were collated using the subscription websites of Metal-Pages™ and Asian Metal. The prices were statistically compared, and little difference between Metal-Pages and Asian Metal was found.

Since the July 29, 2010 Technical Report was issued, China has continued its trend towards controlling its rare earth industry and has continued to limit exports. The result of these actions is that prices for rare earth oxides inside China have increased dramatically. The FOB China price for the ten most popular rare earths (La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, and Y) have increased in price over 950% between July 2010 and

April 2011. Prices have spiked a further 96% in the six week period from May 3 to June 13, 2011.

The efforts of the Chinese to control their rare earth industry have had an impact on the costs of production inside China. In RPA's opinion, prices inside China are more representative of the free market price than they have been in the past – mechanisms such as the export quotas and export taxes that affect the outside or FOB China prices now have a reduced effect.

FUTURE PRICE APPRECIATION

BCC published a study on future pricing of rare earths in 2009. BCC is an information resource for rare earths, producing market research reports, newsletters and conferences. The forecast period of the study is through to 2014, coinciding with the planned start-up time for the Nechalacho deposit. BCC concluded in its report that the combination of demand growth, Chinese government policy, production cost pressures and inflation over the 2010 – 2014 period would likely result in a compound average growth rate (CAGR) of between 20% and 30% in prices for rare earths. This corresponds to an average annual price increase of 9.1%.

Since this study, actual price increases have far exceeded the forecast. Rare earth prices are forecast to continue to be under pressure inside and outside China as demand continues to increase at 9% to 15% per year (CIBC, 2011).

RPA has reviewed the basis for the BCC price forecast and makes the following comments:

- End use demand growth is anticipated to be highest for applications requiring Nd, Pr, Dy, Tb and Y. These oxides are also anticipated to be in relatively short supply, leading to the potential for higher than average price increases;
- La and Ce are anticipated to be in excess supply when new producers start up, as a result of co-production of the less common oxides. Notable La and Ce producers such as Lynas and Molycorp are anticipated to be among the first to begin operations. Prices for La and Ce are projected to regress to previous levels.
- Sm and Gd are projected to be in excess supply even after factoring the potential for substitution of these oxides for more expensive oxides in selected applications. This will limit the potential for price increases for these oxides.

- Demand growth for Ho, Tm, Lu and Yb is expected to be minimal, with a large excess supply. This will constrain the potential for significant price increases for these oxides.
- Chinese authorities are anticipated to adjust production and export quotas to enable Chinese producers to maintain a significant market share, notwithstanding the entry of new, non-Chinese producers. While the focus of Chinese policy will remain on promotion of increased domestic value-added manufacture, RPA anticipates policies will be adjusted to ensure an orderly export pricing scenario for rare earth concentrates and oxides.

Based on the analysis above, RPA believes that CIBC's forecast dated March 6, 2011 (see Table 19-5), is reasonable, or even conservative, as it pre-dates significant price movements in Q2 2011. In RPA's opinion, the CIBC prices are suitable for use in estimation of Mineral Reserves.

TABLE 19-5 CURRENT VERSUS FORECAST PRICES FOR REO
Avalon Rare Metals Inc. – Thor Lake Project

	Avalon	Actual	Actual	CIBC
	July 29, 2010 2014 Forecast	June 13, 2011	June 13, 2011	March 6, 2011 2015 Forecast
Rare Earth Oxide	FOB China (US\$/kg)	Inside China MP (US\$/kg)	FOB China MP (US\$/kg)	FOB China (US\$/kg)
La ₂ O ₃	4.06	23.00	148.00	17.49
Ce ₂ O ₃	2.08	29.00	149.00	12.45
Pr ₂ O ₃	43.87	147.00	239.00	75.20
Nd ₂ O ₃	46.06	208.00	318.00	76.78
Sm ₂ O ₃	5.58	11.00	129.00	13.50
Eu ₂ O ₃	1,086.10	3,332.00	2,990.00	1,392.57
Gd ₂ O ₃	13.70	112.00	203.00	54.99
Tb ₄ O ₇	1,166.09	2,623.00	2,910.00	1,055.70
Dy ₂ O ₃	254.59	1,257.00	1,485.00	688.08
Ho ₂ O ₃	66.35	485.00	-	66.35
Er ₂ O ₃	48.92	-	295.00	48.92
Lu ₂ O ₃	522.93	910.00	-	522.83
Y ₂ O ₃	23.22	55.00	163.00	67.25

Sources:

5. Avalon's July 29, 2010 price forecast for 2014 is from Avalon's 43-101 Technical Report issued July 29, 2010
6. The Actual prices from June 13, 2011 Inside China are from Metal Pages with an exchange rate of 6.482RMB = 1US\$
7. The Actual prices from June 13, 2011 FOB China are from Metal Pages.
8. Avalon's 2015 forecast is drawn from CIBC's March 6, 2011 rare earth industry overview except for the elements Ho, Er and Lu which have been maintained from Avalon's July 29, 2010 forecast.

PRICE ASSUMPTIONS BEYOND 2015

The prices for REE beyond 2015 have been assumed to hold constant at 2015 levels. Demand is expected to continue to grow and could be significantly higher if the adoption of one or more of the major technology applications flourish (e.g. hybrid vehicles, wind turbines, etc.). On the supply side, it is difficult to predict when or if other non-Chinese producers will come on-line. There is not enough information available to be able to make an accurate forecast. Accordingly, RPA and Avalon have chosen to hold prices constant from 2015 onwards.

DETERMINE PRICES FOR AVALON'S PRODUCT

Metallurgical tests have shown that the rare earth elements can be precipitated as a bulk oxide concentrate. This product requires further processing to match the pricing basis of separated, 99% pure REOs. Pay factors for individual REOs contained in a mixed concentrate are highly variable, and dependent largely on supply and demand at the time of separation, and sales contracts for the particular separator involved. RPA reviewed Avalon's assumptions for the various pay factors for the HREOs and LREOs and determined that they were reasonable and consistent with current industry norms in China.

A final price for Avalon's proposed rare earth oxide product was then determined by multiplying the average concentration of the individual rare earth oxides in the rare earth carbonate concentrate by the individual rare earth oxide prices and the payable factors as detailed above. This resulted in an average price for the rare earth carbonate product in 2015 of US\$46.31 per kg (compared to the PFS average price of US\$21.94/kg). This price has been used in preparing the financial analysis detailed in the report.

RPA understands that separation of the REE into multiple fractions will attract higher prices. However, at this time it is not possible to estimate this increase, as no data is available on the differential between unseparated and partially separated REE. Consequently, for the purposes of the pre-feasibility study, the base case has been a single REO concentrate. Research into the pricing of separated REE is also recommended to determine the factors suitable for 2 product and 3 product situations, which are assumed to attract higher factors.

NIOBIUM

NIOBIUM MARKET

Niobium is a refractory metal closely associated with tantalum. Niobium is produced as a primary concentrate from pyrochlore ore, and as a co-product in the production of tantalum concentrates. Niobium finds its primary uses as an alloying agent in the production of high strength low alloy steels (HSLA), in selected aerospace alloys and in stainless steels. In these applications, the primary product form is as FeNb, TiNb and ZrNb. FeNb has a typical analysis of 66% Nb. FeNb and related alloy products account for over 90% of total niobium consumption.

Niobium is also used in electronic and optical applications, in superconducting magnets, fine ceramics, and as a corrosion resistant metal for chemical process equipment. Niobium for these applications is consumed in the form of niobium powder as Nb₂O₅, as pure niobium metal and as niobium salts, primarily as the potassium salt K₂NbF₇ or its derivatives.

Increases in niobium production (and consumption) are attributed to very significant increases in world steel production and a change in the mix of steel production to higher performance grades requiring niobium addition.

NIOBIUM SUPPLY

The niobium production industry is closely controlled with three producers essentially holding a monopoly position. All three companies are primary producers of niobium concentrates for internal consumption. The dominant producer is Comphania Brasileira de Metalurgia e Mineração (CBBM) in Brazil. CBBM is a fully integrated producer and the only company producing all forms of niobium. CBBM holds an approximate 70% share of the world market for FeNb products and a significant share of the world market for pure niobium, NiNb and TiNb and other specialty alloys, niobium chemicals and niobium powder.

The other major primary producers of niobium are Mineração Catalão de Goiás S.A. (Catalão) in Brazil and Niobec in Canada. These latter two companies control about 20% of the total niobium market and share the FeNb market approximately equally with about 15% market share each. Together with CBBM, they control essentially 100% of the FeNb market. CBBM, Catalão and Niobec are fully integrated producers sourcing their

niobium feedstock from pyrochlore ore. Mineração Taboca, also in Brazil, produces a mixed FeNbTa alloy which is subsequently processed by others to produce separate niobium and tantalum products.

The balance of niobium supply is comprised of producers primarily focused on specialty niobium products such as NiNb, TiNb, and ZrNb alloys and pure niobium. The three largest of these are Cabot Corporation in the United States, H.C. Starck in Germany, and Wah Chang in the United States. These companies are not backward integrated to production of niobium concentrate and rely on Ta-Nb concentrates and Nb k-salt as their sources of niobium.

As demand for niobium grows steadily, the major producers will tend to increase production to follow suit. The major producers have sufficient capacity to meet increased demand and no shortage of niobium is anticipated.

NIObIUM PRICING

The primary sources of information for niobium pricing are a Roskill report on niobium, Asian Metals historical prices for Nb₂O₅ (niobium pentoxide), and NI 43-101 reports by niobium exploration and mining companies.

Prices for FeNb have been historically stable. CBBM has historically been the price setter and has set prices sufficient to provide the smaller producers a reasonable operating margin and thus ensure a competitive supply base to the steel industry. From 1990 until 2006 the average export price of Brazilian ferro-niobium remained within the range of US\$12,500/t – 13,500/t contained Nb. There was an adjustment in 2007-2008 and prices increased and in some markets doubled. The increase in price for FeNb reflected the very strong price increases for other steel raw materials and for steel in the same period. Prices declined in 2009 along with the decline in the world steel industry.

Since the PFS (July 2010), Nb₂O₅ prices have increased 26%, to US\$50.50/kg, according to Asian Metal. FeNb prices have increased by 7% since July 2010.

UPFS prices are based on the same methodology used in the PFS – a two-year (March 2009 to April 2011) trailing average price of US\$39.98/kg, adjusted for world inflation and forecast escalation in steel demand.

The IMF forecasts world inflation to be 4.4% in 2011 and 4.5% in 2012, driven by large, rapidly-growing countries such as India and China. Avalon has assumed inflation of 3% after that.

Steel prices have increased close to 20% since July 2010 according to MEPS, a steel industry consultant. Avalon has assumed an annual increase in steel demand of 5%, as was done in the PFS.

The result is a forecast for Nb₂O₅ of US\$ 55.86/kg for 2015. See Table 19-6 for more detail.

TABLE 19-6 PRICE PROJECTIONS TO 2015 FOR NIOBIUM
Avalon Rare Metals Inc. – Thor Lake Project

	Nb₂O₅ (US\$/kg)	World Inflation escalation	Steel Demand escalation
Base	39.98	4.40%	5.00%
2012	43.74	4.50%	5.00%
2013	47.89	3.00%	5.00%
2014	51.72	3.00%	5.00%
2015	55.86		

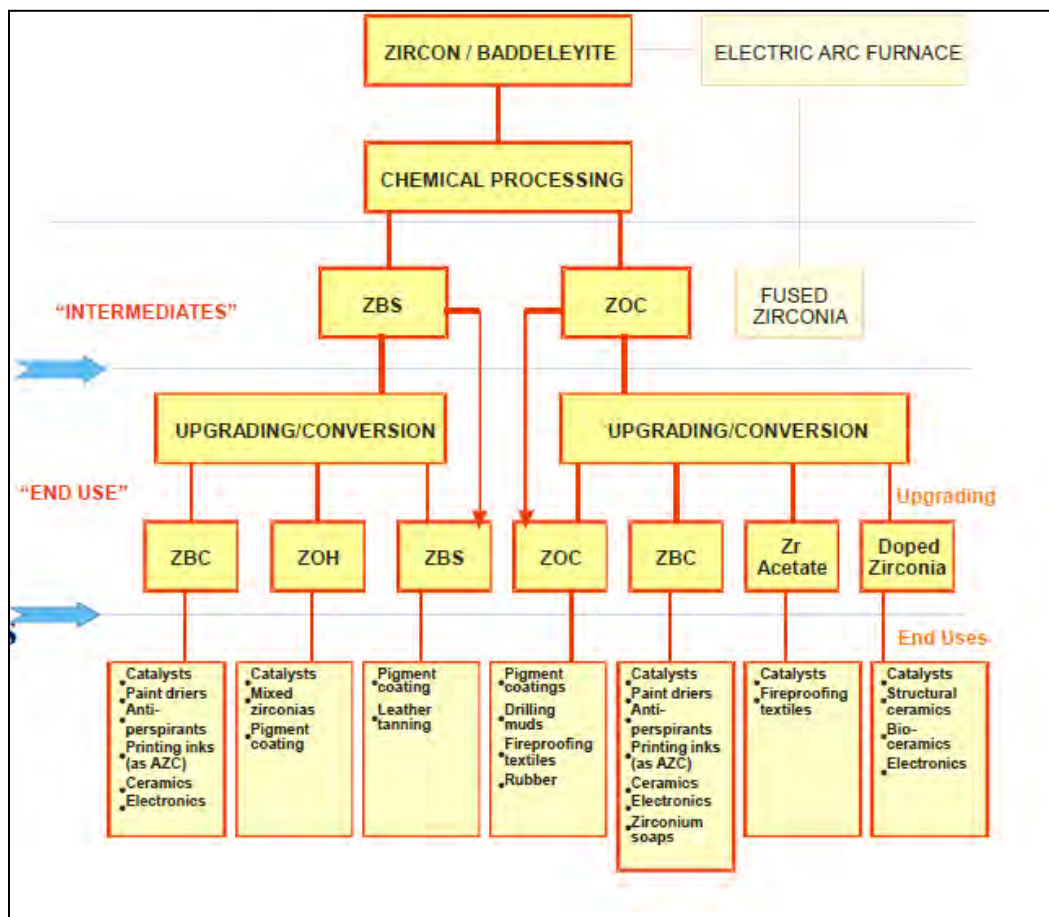
US\$ 39.98/kg is the Asian Metal average price for the 2 year period between March 2009 and April 2011 for 99.5% Nb₂O₅ FOB China.

ZIRCONIUM

ZIRCONIUM MARKET

Avalon will produce a hydrated zirconium dioxide (ZrO₂) product at the hydrometallurgical plant for Thor Lake in either of two forms: zirconium oxychloride (ZrOCl₂·8 H₂O), also referred to as 'ZOC' or zirconium basic sulphate (ZBS). ZOC and ZBS are used in a wide variety of end use applications, detailed in Figure 19-3.

FIGURE 19-3 ZOC AND ZBC APPLICATIONS

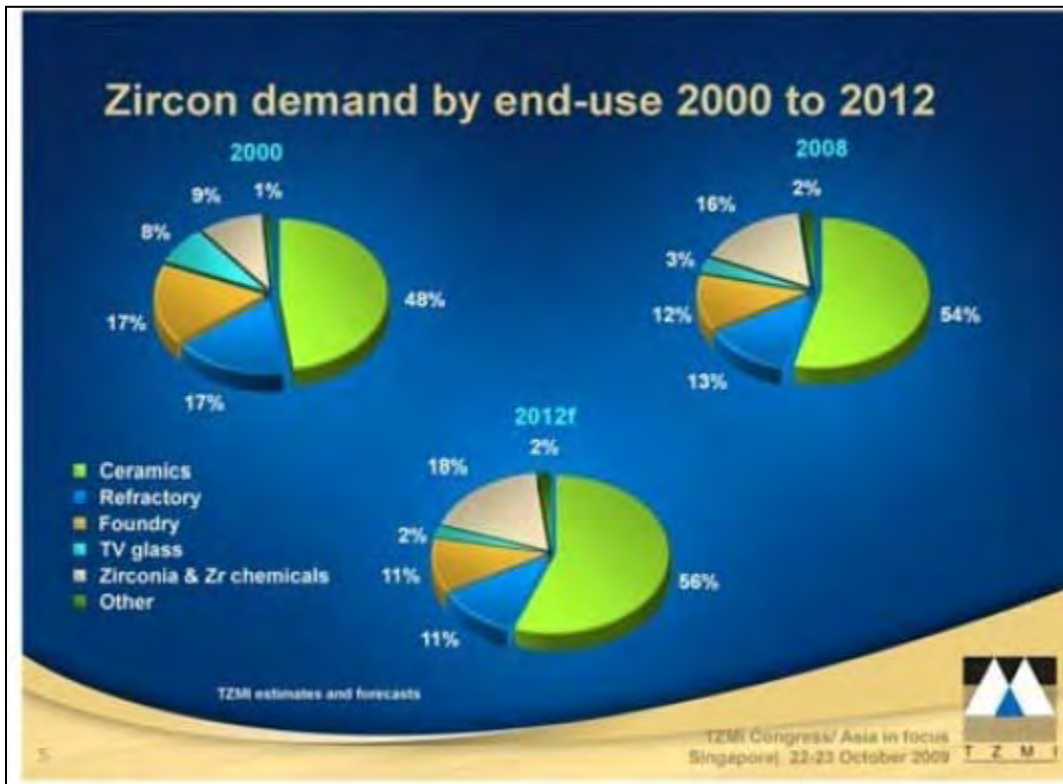


Source: TZMI

While the primary uses for zircon (zirconium silicate) are as an opacifying agent in ceramics and as a refractory material in metal casting, zircon is also converted into a wide variety of chemicals and to zirconium metal.

Demand for zircon in chemicals manufacture and zirconium metal production is projected to increase to approximately 250,000 tonnes out of a total zircon demand of approximately 1.4 million tonnes by 2012. Changes in end use demand patterns in recent years are illustrated in Figure 19-4.

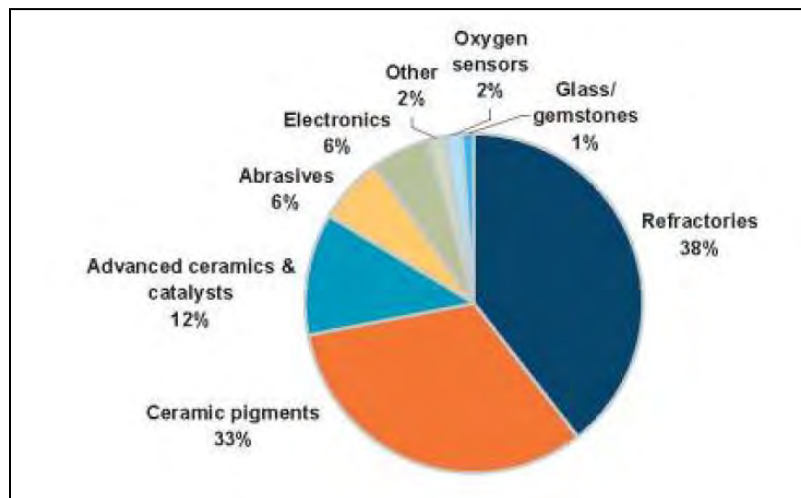
FIGURE 19-4 ZIRCON DEMAND PATTERNS, 2000 TO 2012



Source: TZMI

Industry growth is estimated at approximately 4.5% per annum. By 2015, demand for zirconium chemicals is projected to be approximately 150,000 tonnes, distributed as detailed in Figure 19-5.

FIGURE 19-5 ZIRCONIUM CHEMICAL DEMAND – 2015



Source: TZMI

Particularly fast growing applications are anticipated to be advanced ceramics and catalysts at 13% per annum and ceramic pigments at 8% per annum.

It is important to note that the production process has a very significant impact on the properties of the resultant ZrO_2 . Because of this, no two sources of raw material are the same and no two zirconia products are the same. ZrO_2 products are therefore process dependent and application specific.

ZIRCONIUM PRICING

China is the dominant world supplier of zirconium chemicals and as a result sets world prices for the various zirconium chemical products. Historic Chinese export prices for ZrO_2 (also including fused zirconia) are detailed in Table 19-7.

TABLE 19-7 HISTORIC CHINESE EXPORT PRICE FOR ZIRCONIA
Avalon Rare Metals Inc. – Thor Lake Project

China Exports	2006	2007	2008	2009
Total US\$/kg	4.18	5.08	4.27	4.67

Source: Z-Tech Zirconias, 2010

More definitive prices for specific zirconium chemicals are difficult to obtain. Published data from Asian Metals show zirconium oxychloride prices from 2007 to 2011 (Table 19-8).

Information earlier than 2007 was not available. ZOC contains minimum 36% zirconia, as defined by Asian Metals. No price data have been found for ZBS and it assumed that the pricing for ZOC and ZBS are the same.

The average price over the period January 2007 to January 2010, based on this analysis, was US\$1,357 per tonne, with a very narrow range of fluctuation. Given the 36% zirconia minimum content, this can be converted to a price of US\$3.77 per kg of contained ZrO_2 equivalent. This price was used for the PFS.

Zircon sand (Australian ZrO_2 66% min CIF China) has increased in price by 110% to US\$1,985 per tonne since July 2010, according to Asian Metal. Prices for zirconium

chemicals have also increased, consistent with the price increase for zircon sand which is the raw material for most of the world's zirconium chemicals production.

TABLE 19-8 PRICES FOR ZIRCONIUM OXYCHLORIDE, CHINA (36% MIN. CONTAINED ZRO₂)

Avalon Rare Metals Inc. – Thor Lake Project

Date	US\$/t
23-Jan-07	\$1,350
27-Feb-07	\$1,350
22-Mar-07	\$1,350
07-Aug-07	\$1,380
24-Jun-09	\$1,450
19-Aug-09	\$1,400
16-Oct-09	\$1,318
01-Dec-09	\$1,303
13-Jan-10	\$1,310
2007 – 2009 Average	\$1,357
16-Apr-10	\$1,348
25-May-10	\$1,362
29-Jun-10	\$1,369
10-Aug-10	\$1,404
29-Sep-10	\$1,479
09-Nov-10	\$1,866
23-Dec-10	\$2,238
26-Jan-11	\$2,238
23-Feb-11	\$2,355

Source: Asian Metals

Despite increasing zircon and zirconium chemicals prices, Avalon is comfortable with a more conservative approach to its zirconium price forecast, and therefore no increase in the PFS price was applied for the UPFS.

TANTALUM

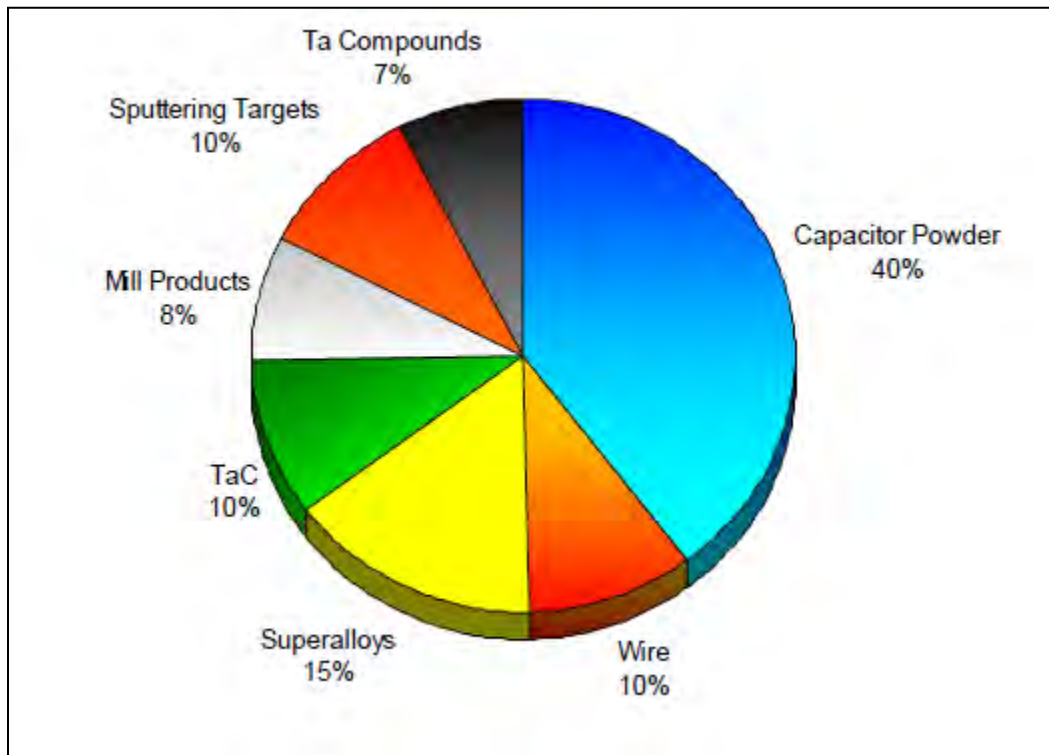
TANTALUM MARKET

The Avalon hydrometallurgical plant is expected to produce tantalum as tantalum oxide or as a potassium salt. Tantalum is a refractory metal closely associated with niobium.

The primary use for tantalum is as the oxide, Ta_2O_5 , for use in high performance capacitors for electronics. Tantalum also finds application in other electrical and electronic applications; as an alloying agent in the production of various high temperature superalloys; as a carbide in the production of cutting tools; and in the form of tantalum metal for chemical process equipment (Figure 19-6).

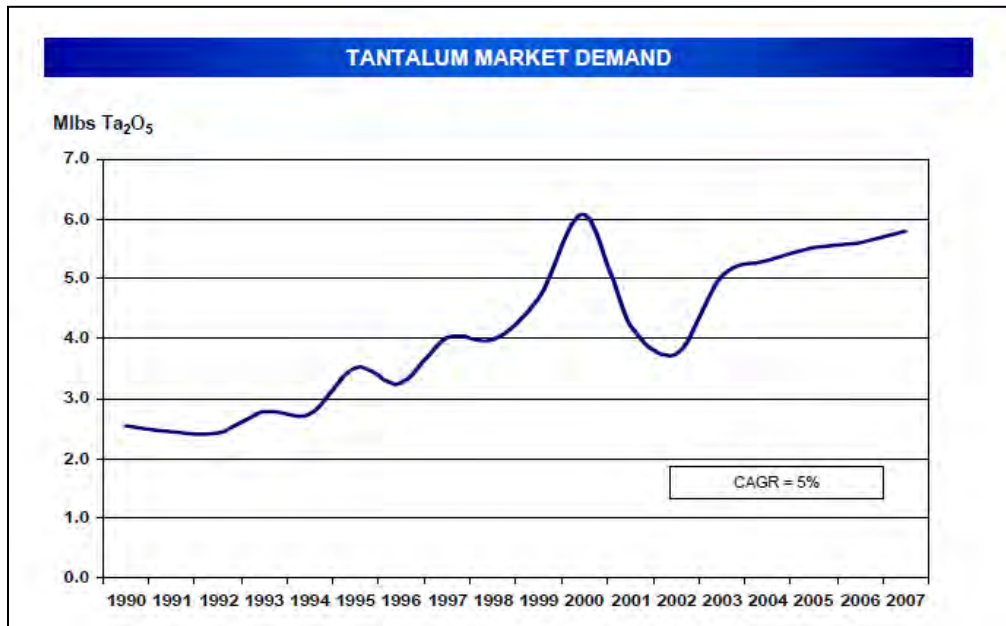
World tantalum demand in 2008 was estimated at approximately 6.1 million pounds contained Ta (Figure 19-7) and is projected to grow to approximately 7 million pounds by 2012 (Figure 19-8), assuming a 4% per annum compound growth rate.

FIGURE 19-6 TANTALUM MARKETS



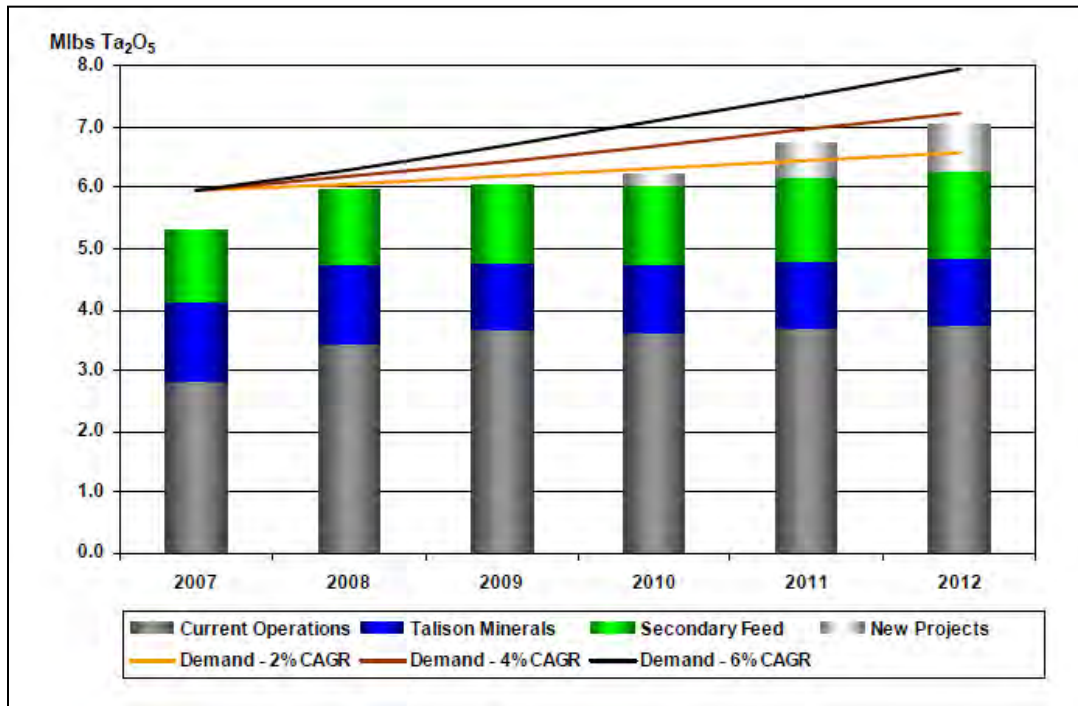
Source: Talison Tantalum, 2008 (Total Demand 2,000 t contained Ta)

FIGURE 19-7 HISTORIC TANTALUM DEMAND



Source: Talison Tantalum, 2008

FIGURE 19-8 FORECAST TANTALUM SUPPLY/DEMAND TO 2012



Source: Talison Tantalum, 2008

As can be seen from Figure 19-8, new sources of supply will be required by 2012 at even very modest levels of demand growth.

TANTALUM PRICING

Tantalum prices are established between buyer and seller on a negotiated basis and actual prices may vary considerably from published prices. Prices are influenced by the ability of a producer to provide a consistent source of supply with guaranteed analysis and proven ability to demonstrate socially responsible mining (a significant portion of current supply is derived from conflict sources). Contract prices for tantalum tend to be above the spot price.

Tantalum Pentoxide prices have increased 81.2% between July 2010 and April 2011, from US\$212.50 per kg to US\$385.00 per kg, according to Asian Metal. The average price during this period was US\$220.86 per kg. This average was escalated for inflation from 2011 to 2015 to calculate a forecasted tantalum pentoxide price of US\$255.63/kg. See Table 19-9 for details.

TABLE 19-9 PRICE PROJECTIONS TO 2015 FOR TANTALUM PENTOXIDE
Avalon Rare Metals Inc. – Thor Lake Project

	Ta ₂ O ₅ (US\$/kg)	World Inflation escalation
Base	220.86	4.40%
2012	230.58	4.50%
2013	240.95	3.00%
2014	248.18	3.00%
2015	255.63	

MARKETING CONCLUSIONS

While the prices used in the PFS were higher than current prices at the time, RPA notes that UPFS prices for all products are lower than current. The prices are based on independent, third-party forecasts for 2014, price performance since 2009, as well as supply and demand projections and world inflation rates from 2009 to 2015. Since the Project schedules production commencing in 2015, RPA is of the opinion that these long-term price forecasts are a reasonable basis for estimation of Mineral Reserves.

CONTRACTS

At this time Avalon has not entered into any long term agreements for the provision of materials, supplies or labour for the Project. Avalon has entered into a negotiation

agreement with the Deninu Kue First Nation (DKFN), Yellowknives Dene First Nation (YKDFN) and subsequently signed a similar agreement with the Lutsel K'e Dene First Nation (LKDFN). This type of initial agreement (often referred to as a memorandum of understanding (MOU), is done in order to frame the negotiations toward an impacts and benefits-type agreement. Avalon has commenced negotiations on Accommodation Agreements, with LKDFN, YKDFN and DKFN, with the objective of concluding these agreements in 2011.

The construction and operations will require negotiation and execution of a number of contracts for the supply of materials, services and supplies.

20 ENVIRONMENTAL STUDIES, PERMITTING, AND SOCIAL OR COMMUNITY IMPACT

Environmental baseline studies were completed for the Thor Lake site by Stantec Inc. in January 2010. Based on the baseline studies and the PFS project plan, EBA Engineering Consultants Ltd. provided a list of potential effects and mitigation measures. Using EBA's list, Avalon has since submitted Developers Assessment Report to the Mackenzie Valley Environmental Impact Review Board and is awaiting final conformity checks.

The observed baseline conditions, possible risks and mitigation measures are discussed below.

THOR LAKE

GENERAL ECOLOGY

The TLP is located within the Great Slave Upland High Boreal (HB) Ecoregion, which is a subdivision of the more extensive Taiga Shield HB Ecoregion (Ecosystem Classification Group 2008). The landscape is dominated by subdued topography and fractured bedrock plains. Black spruce, jack pine, paper birch, and trembling aspen form discontinuous forested patches that are interspersed with exposed rock. Wetlands and peat plateaus commonly form around the margins of shallow lakes, as well as in wetter depressions and lowlands.

Lakes cover a substantial portion of the Ecoregion and several major rivers are also present, eventually draining into Great Slave Lake (Ecosystem Classification Group 2008). Lakes are characterized as transitional between those located within the former basin of Glacial Lake McConnell, which are more shallow and silty, and those occupying areas at higher elevations, which are deeper and clearer.

HYDROGEOLOGY

Hydrogeological tests were conducted by Stantec using multipurpose holes drilled by Avalon during 2008-2009. Five holes were installed as monitoring wells, and one hole

was installed with a thermistor. Hydrogeological parameters studied include groundwater elevation, hydraulic conductivity, groundwater temperature, and hydrogeochemistry.

Groundwater elevation was observed to be 0.7 m to 4.5 m below ground surface in all the wells. A minimum thermistor reading of -0.75°C was recorded at 14 m below ground surface, which was the maximum depth of the string. Recovery tests yielded hydraulic conductivity estimates ranging from 6.06×10^{-8} m/s to 3.08×10^{-5} m/s, while packer tests yielded estimates from 1.66×10^{-6} m/s close to surface to 2.90×10^{-8} m/s at depth. Hydrogeochemical tests show that the dominant cations are sodium and magnesium, and the dominant anion is carbonate.

SURFACE HYDROLOGY

The Thor Lake drainage basin is characterized by numerous lakes, marshes and streams. The lakes vary in size and bathymetry. Connectivity between lakes is limited to small streams. Lake level and stream flow measurements were made during 2008 and 2009 for the Murky, Thor and Fred lakes. Lake levels decreased in the summer, and rose moderately in September due to increased rainfall. Recorded stream flows in 2009 averaged less than $0.1 \text{ m}^3/\text{s}$ for the Murky Lake outlet, less than $0.2 \text{ m}^3/\text{s}$ for the Fred Lake outlet and less than $0.3 \text{ m}^3/\text{s}$ for the Thor Lake outlet. A reverse in flow between Thor and Long lakes was observed by Stantec.

EBA identifies potential effects to surface hydrology and suggests some mitigation measures. Effects include reduction in discharge from Thor Lake, and increased spring time flow through Drizzle and Murky lakes. Mitigation measures include compliance with MVLWB terms and conditions, and recycling of water.

FISHERIES AND AQUATICS

Baseline studies included investigation of water quality, aquatic ecology, and fisheries values in nine watercourses and 25 lakes that will be directly or indirectly affected by project development. Water samples collected at 23 lakes indicate that the mean pH ranges from 7.07 to 8.62, with a large range of conductivity and hardness, and low nutrient levels. Sediment characteristic varied across the study area, though generally showed high phosphorus, organic carbon and nitrogen content. Iron, arsenic, silver, nickel and copper concentrations in sediments were found to be higher than CCME guidelines.

Fisheries studies were conducted in 19 lakes, of which 11 were considered fish-bearing. The most common species found were the northern pike, lake whitefish, lake cisco, slimy sculpin, and ninespine stickleback, all of which were present in Thor, Long, Elbow, A and Redemption lakes. Catch per unit effort was calculated for the five species of fish. Fish health assessments included length, weight, examination for parasites, analyses for mercury, metals and rare earth elements. Parasite frequency was found to be low among large-bodied species, and highest in lake whitefish.

EBA identifies potential effects to fish habitat and suggests some mitigation measures. Effects include changes in flow patterns and lake levels as a result of the water consumption and loss of fish habitat due to the construction of the tailings management facility and barge-dock system. Mitigation measures include recycling of water, construction of a seasonal pipeline from Drizzle Lake to Thor Lake to supplement winter water levels in Thor Lake, and to reduce high storm event discharges, the adherence to Best Management Practices and compliance with permit terms.

SURFICIAL GEOLOGY

The landscape of the project area shows evidence of glacial and post-glacial activity (Stantec 2010). Large parts of the area consist of bedrock outcrops, while the remainder is consists of discontinuous veneers and blankets of till and organic matter overlying bedrock, and lakes and streams. Soils consist of post-glacial and glaciofluvial deposits. A majority of the soils are mineral in nature. A total of eight soil types were identified and mapped. The active layer varies between 40 and 200 cm in thickness.

ECOSYSTEMS

The regional study area was defined as a region of 15 km radius around the Thor Lake site, while the detailed ecosystem mapping was conducted around a local study area of 1,780 ha around the site. Mapping was carried out using remote sensing and field programs. The results show that the regional study area is composed of 11,200 ha of coniferous forest ecosystems, 4,527 ha of treed fern ecosystems, 8,761 ha of wetlands, and 5,693 ha of deciduous dominated or mixed forest types. One hundred and forty seven plant species including mosses and lichens were documented in the survey of the study area. One rare plant *Polypodium virginianum* was identified 100-150 m from the eastern shore of long lake.

The project area is inhabited by birds, mammals, insects, amphibians and one species of reptile. Fifteen species of wildlife were chosen as key indicators based on conservation status, occurrence, sustenance value, socio-economic value and ecological value. They included four species of mammal and eleven species of bird.

EBA identifies potential effects to fish habitat and suggests some mitigation measures. Potential effects include degradation or loss of habitat, alteration of soil and permafrost conditions, changes to ecosystem composition due to emissions of dust, nitrogen oxide and sulphur oxide. Mitigation measures include minimization of project footprint area, compliance with MVLWB terms, implementation of erosion control, use of dust suppressants, utilization of low-sulphur diesel, and a co-operative approach involving First Nations and wildlife regulators.

SEISMIC EVALUATION

Knight Piésold of North Bay, Ontario performed a seismic evaluation of the Thor Lake and Pine Point sites. The following information is taken from Knight Piésold's report.

The central region of the Northwest Territories where the project is located is historically a quiet earthquake zone; only a few minor seismic events (magnitude of 4 or below) have happened in the area between 1627 and 2007. Major historic seismic events (magnitude as high as 7) have occurred more frequently along the west border of the province, adjacent to the east side of the Yukon Territory, during the period of record.

Seismic hazard for the TLP has been examined using the probabilistic calculations as per the 2005 National Building Codes (NBC) for the site area released by Natural Resources Canada.

Seismic hazard is quantified using spectral acceleration, which is the amount of ground motion for sustained shaking energy at a particular period. Spectral acceleration at periods of 0.2, 0.5, 1.0 and 2.0 seconds (equivalent to frequencies of 5, 2, 1, and 0.5 Hertz) are used to fully quantify seismic hazard as Uniform Hazard Spectra (UHS). Although spectral acceleration is considered a better measure of potential damage than the peak measures used by the 1995 code, the peak ground acceleration is still used for foundation design.

Ground motion probability is expressed in terms of probable exceedance of a given horizontal acceleration or velocity over a particular time span. The probability used in the 2005 NBC is 0.000404 per year. This corresponds to an event with a return period of 1 in 2,500 years, or a 2% chance of an earthquake causing horizontal ground motion greater than the given expected value over a 50-year period.

The conditions at site are believed to generally consist of relatively shallow deposits of sandy till (generally <10 m) and outcropping bedrock. In the absence of site specific investigation data, "Class C" (very dense soil and soft bedrock) is judged to be an appropriate worst case classification. Based on the Class C assumption and the 2005 NBC probabilistic calculations, the Thor Lake site has a peak ground acceleration of 0.059 g (50th percentile) for a 1 in 2,500 year earthquake event, which is a relatively low value. All parameters are expressed as a fraction of gravity.

ROCK CHARACTERISATION

SGS Minerals Services of Peterborough, Ontario, was contracted by Avalon Rare Metals Inc. to complete environmental characterization of ore, concentrate, tailings and waste rock from the project. Environmental tests were conducted on ore composites, concentrates and tailings from the locked cycle test flotation project, a concentrate sample supplied by the hydrometallurgical group and waste rock and ore samples from the SAG design program. The purpose of the environmental test program was to assess the geochemical, acid rock drainage (ARD), contaminant release potential, radioactivity, and geotechnical characteristics of the Avalon products.

Leach tests were performed on the ore, concentrate, tailings and waste rock. Shake flask extraction leachates showed that waste rock was alkaline, while acid base accounting tests showed that the ore and concentrate were potentially acid neutralizing, with generally low sulphur and higher carbonate neutralizing potential. Most tests reported pH values and other parameters within World Bank limits with the exception of total suspended solids in the fresh tailings solution.

Settling tests on the tailings samples concluded that the suspended solids would settle out of the slurry fairly quickly. In the lab, solids settled out of the slurry in 2 to 2.5 hours, reaching terminal density shortly thereafter. Tests also concluded that drainage would improve the rate of settling of solids.

The radionuclide analysis of the Nechalacho solids typically reported increased levels of radionuclides in the concentrate samples in comparison to the ore composites, while tailings reported lower levels than the ore samples.

Thor Lake has uranium levels that are higher than average naturally occurring granite but are below levels typically experienced in other rare earth deposits. The thorium levels in the Nechalacho deposit are anomalous, but given the lower radioactivity equivalency of thorium relative to uranium, the overall effect of typical Nechalacho mineralization as a rock mass is predicted to be very low. The rare earth concentration process planned at the Flotation Plant will concentrate the rare earths including the low levels of thorium in the rock minerals. The overall radiation level is expected to be below Canadian Transportation of Dangerous Goods regulations and will not require special handling as dangerous goods.

PINE POINT

The Pine Point environmental conditions are summarized by EBA based on various sources, and studies done by EBA in 2005 and 2006. The area of interest is located in the Great Slave Lowlands Mid-Boreal Ecoregion of the Taiga Plains Ecozone (Ecosystem Classification Group 2007).

Nearly level lacustrine and alluvial deposits with a mosaic of sedge wetlands and grass meadows, diverse forests and wetlands typify the Slave Lowland MB Ecoregion. The vegetation of this Ecoregion is characterized by medium to tall, closed stands of jack pine and trembling aspen. White spruce and black spruce dominate later successional stands. Poorly drained fens and bogs in this region are covered with low, open stands of larch), black spruce and ericaceous shrubs.

Moose, woodland caribou and occasionally wood bison are the main ungulates found in the area of interest, although none are considered common. As confirmed by Traditional Knowledge interviews conducted for the nearby Tamerlane Pilot Project, hunting and trapping activities occur throughout this area. The bird life present is typical of the boreal forest, and the south shore of Great Slave Lake is considered to be an important concentration site for birds during their annual migrations.

SURFACE HYDROLOGY

The area of interest is flat to gently sloping and a considerable portion of the area is covered by poorly drained muskeg ranging up to 3 m deep. The area also contains several generally east-west low ridges, which are considered to have been formed by old lake-level beaches. Extensive wetland areas and small lakes are located in the area. No streams are present in the proposed haul road alignment.

Great Slave Lake is the final receptor of all surface water draining from the area of interest. Historic data available on lake levels at the Water Survey of Canada recording station at Hay River (Station 0708002) indicate that the mean lake level has been 156.7 metres above sea level (masl) with normal seasonal variations between 156.6 and 156.9 masl and extreme variations recorded of 157.3 and 156.2. Highest water levels typically occur in mid-summer.

SOILS

The general area is described in the Soils of the Slave River Lowland as low-lying flat land with numerous lakes and abandoned stream channels. The soil climate is subarctic (humid) with some discontinuous permafrost. In much of the area, soil development has been influenced by the presence of water for much of the year.

The soils in the study area are primarily Eluviated Eutric Brunisols in upland areas and Terric Organics and Gleysols in lowland areas. Cumulo Organics were encountered; most likely a result of the formation and flooding regimes of Glacial Lake McConnell. The cumulo layers are remnants of past glaciation. These soils will become Terric and Typic organics with the passage of time. Mineral soils vary in texture from gravel to clay. Sand is most common (EBA 2005a).

Discontinuous permafrost has been reported in some localized areas within the overburden.

VEGETATION

Vegetation mapping of the general Pine Point area was first undertaken in 1977 by BC Research using black and white aerial photographs and fieldwork. Mapping of the area was carried out again using aerial photographs taken in June 1979 by Beak Consultants Ltd.

In September 2005, EBA collected new baseline vegetation and ecosystem data for the proposed Tamerlane Pilot Project Regional Study area located immediately to the west of the current area of interest.

The main wetland ecosystems present in the area of interest include Graminoid, Shrubby and Treed Fen ecosites. The fens are generally restricted to areas of poorly drained organic soils. Soils tend to be rich in nutrients. Stand composition in the region varies due to the fire regime. Early successional stands are dominated by an open canopy of bog birch, while mature stands have a closed canopy of black spruce and larch.

WILDLIFE

Early science-based wildlife studies of the Pine Point area were first conducted during the period 1976 to 1980 by BC Research to evaluate the environmental consequences of Cominco's mining operation at Pine Point (BC Research 1983). More recent wildlife studies of the Tamerlane Regional Study Area (RSA) were carried out by EBA in September 2005 and during the spring, summer and fall of 2006 (EBA 2006a, 2006b). Based upon wildlife surveys, interviews, and published information, EBA estimates that the Pine Point area is inhabited by 40 species of mammals, 201 species of birds, and four species of amphibians. Major mammal species include the snowshoe hare, red squirrel, American beaver, common porcupine, coyote, gray wolf, black bear, ermine (stoat), mink, lynx, woodland caribou, moose, and the wood bison. Ten of the most common bird species include the American robin, tundra swans, white-winged scoter, gray jay, common raven, spruce grouse, and the bohemian waxwings.

POTENTIAL EFFECTS, MANAGEMENT AND MITIGATION

EBA suggests that the implementation of the following measures will minimize the impact of Avalon's operations at Pine Point on the surrounding area and help Avalon meet the requirements of the MVLWB:

- Utilization of the existing power grid at Pine Point to reduce the need for diesel power generation at the Nechalacho Mine and Flotation Plant site.
- Full compliance with MVLWB Land Use Permit and Water Licence terms and conditions.
- Conformance with the Guidelines for Ambient Air Quality Standards in the NWT.
- Use of low sulphur diesel fuel and regular equipment and engine maintenance.

- Use of high quality, low sulphur coal to generate high heat fuel for the Hydrometallurgical Plant boilers.
- Application of clean coal technologies, stack testing and air quality monitoring to ensure that federal and territorial ambient air quality objectives are met.
- Conformance with GNWT Guideline for Dust suppression through the application of dust suppressants - e.g. water or approved dust suppressant products.
- Secure containment of rare metals products during transportation to the Hay River railhead.
- Disposal of all hazardous wastes in an approved manner.
- Development on rare ecosystem types will be avoided (none are anticipated to be present within the Hydrometallurgical Plant components of the overall Project footprint).
- Re-contouring, scarification, and reseeded of the haul road surface during future closure and reclamation of the road will be carried out, if warranted.
- The seasonal barging dock will be designed and constructed to meet the requirements of Transport Canada and conditions of the NWPA approval to be issued pursuant to the Navigable Waters Protection Act.
- Conformance with a DFO Authorization or Letters of Advice to avoid the harmful alteration, disruption, or destruction (HADD) of fish habitat due to seasonal dock installation.

PROJECT PERMITTING

PERMITTING

The construction and operation of the TLP (all components) will require a Type A Water License for all water uses, and a Type A Land Use Permit. The Mackenzie Valley Land and Water Board (MVLWB) is the regulatory body responsible for permit issuances under the authority of the Mackenzie Valley Resource Management Act, the Mackenzie Valley Land Use Regulations, and the Northwest Water Regulations.

Other environmental permits/approvals anticipated to be required for the TLP include:

- A Navigable Waters Protection Act (NWPA) approval for the seasonal docking facilities; and
- A Section 35.(2) Fisheries Authorization or Letters of Advice from the Department of Fisheries and Oceans (DFO) under the federal Fisheries Act.

MINE CLOSURE REQUIREMENTS

NECHALACHO RECLAMATION

Reclamation and closure of all the Nechalacho Mine and Flotation Plant facilities will be conducted in accordance with the terms and conditions of the future MVLWB Land Use Permit and Water Licence, the “Mine Site Reclamation Policy for the Northwest Territories” and the “Mine Site Reclamation Guidelines for the Northwest Territories and Nunavut” (INAC, 2007).

Reclamation and closure will be based on the following general objectives:

- Reclamation goals and objectives will be considered during design and planning of construction and operations;
- Progressive reclamation will be implemented where possible;
- Upon cessation of operations, the areas will be decommissioned and rehabilitated to allow for future land use as guided by the federal and territorial regulatory agencies; and
- Reclamation and closure will ensure that long-term physical and chemical stability is provided.

The initial reclamation and closure plan prepared for the Nechalacho Mine and Flotation Plant site will be a living document that will be updated throughout the Project’s life to reflect changing conditions and the input of the applicable federal and territorial regulatory agencies.

The primary reclamation activities will involve the removal of surface facilities and infrastructure, the re-contouring and scarification of the footprint area, the application of stockpiled organics, and re-vegetation to the extent possible.

Specifically for the tailings management facility, the main objective of the closure and reclamation initiatives will be to transform the tailings management facility area to its pre-mining usage and capability to the greatest degree possible. Closure and reclamation strategies will focus on stabilizing and covering the exposed tailing surfaces and re-establishing surface flow patterns, while ensuring that acceptable downstream water quality is maintained. Specific reclamation activities pertaining to the tailings management facility area will include the following:

- The downstream face of the embankments will be reclaimed as the final downstream slope is constructed. Progressive reclamation will be implemented to the greatest degree possible;
- The exposed tailings surface will be capped with stockpiled organics and re-vegetated;
- Surface runoff control channels and permanent spillways will be constructed as required to provide sustainable surface runoff conditions; and
- Infrastructure not required beyond Mine closure will be dismantled and removed.

The tailings management facility will be designed and reclaimed to maintain long-term physical and geochemical stability, protect the downstream environment and effectively manage surface water. A post-closure monitoring program will include an annual inspection of the tailings management facility for a prescribed period to confirm the completed closure measures are meeting permit and licence conditions.

RECLAMATION

Consistent with the approach to reclamation of the other Thor Lake Project site facilities, the facilities to be located at the former Pine Point Mine site will be conducted in accordance with the terms and conditions of the future MVLWB Land Use Permit and Water Licence, the “Mine Site Reclamation Policy for the Northwest Territories” and the “Mine Site Reclamation Guidelines for the Northwest Territories and Nunavut” (INAC 2007).

Reclamation and closure will be based on the following general objectives:

- Reclamation goals and objectives will be considered during design and planning of construction and operations.
- Progressive reclamation will be implemented where possible.
- Upon cessation of operations, the areas will be decommissioned and rehabilitated to allow for future land use as guided by the federal and territorial regulatory agencies.
- Reclamation and closure will ensure that long-term physical and chemical stability is provided.

The primary Project reclamation activities at Pine Point will involve the removal of surface facilities and infrastructure, the re-contouring and scarification of the Project footprint area, and where appropriate, the application of stockpiled organics, and re-vegetation to the extent possible.

The Pine Point site has been previously reclaimed by industry and government since closure of the mine in 1987. As a result, it is anticipated that closure and reclamation activities associated with the main facilities to be located at the former Pine Point Mine site (Hydrometallurgical Processing Plant and tailings containment area), will be limited to those associated with returning these areas to the previously existing brownfields condition.

RECLAMATION AND CLOSURE

A closure plan will be developed for the project. The closure plan will be developed using the guidelines noted above. EBA prepared a closure cost estimate for the operation as shown in Table 20-1.

For the purposes of the project cash flow RPA deducted C\$2.25 million recognizing the salvage value that will be realized from some of the infrastructure and buildings as they are removed from the site.

TABLE 20-1 CLOSURE COST ESTIMATE
Avalon Rare Metals Inc. – Thor Lake Project

Component	Cost (C\$ Millions)
Nechalacho Mine and Flotation Plant	
Tailings Pond and Associated Infrastructure	
Capping	2.0
Re-contouring	0.5
Re-vegetation	0.3
Infrastructure Removal	
Buildings	2.0
Roads	0.5
Fuel Storage	1.0
Airstrip	0.5
Adits/Underground	0.2
Waste Rock	0.2
Hazmat	0.2
Contractors	0.5
Project Management	0.2
Nechalacho Mine and Flotation Plant Total	8.1
Hydrometallurgical Plant	
Tailings Pond Capping	0.5
Infrastructure Removal	1.0
Hazmat	0.2
Contractors	0.3
Project Management	0.2
Hydrometallurgical Plant Total	2.2
Long-term Monitoring (5 years @ C\$150K/yr)	0.75
Infrastructure value offset	-2.25
Subtotal	8.80
Contingency (25%)	2.2
Reclamation Estimate Total	11.00

21 CAPITAL AND OPERATING COSTS

CAPITAL COST ESTIMATE

The capital cost estimate relies heavily on the PFS work, with minor adjustments, described below. PFS costs were compiled from work by Melis (mill costs and hydrometallurgical plant costs) and RPA. The UPFS capital estimate summarized in Table 21-1 covers the life of the project and includes: initial capital costs, expansion capital costs, and end-of-mine-life recovery of capital invested in initial fills for reagents, fuel and cement and in spare parts.

TABLE 21-1 CAPITAL COST ESTIMATE
Avalon Rare Metals Inc. – Thor Lake Project

Area	Units	Yrs 1-3	Yrs 4-23	LOM Total
Mine & Surface	C\$ Millions	96.91	17.05	113.97
Concentrator & tailing	C\$ Millions	215.22	5.03	220.26
Hydrometallurgical Facility	C\$ Millions	299.97	43.66	343.63
Other Costs	C\$ Millions	86.10	(4.00)	82.10
Contingency	C\$ Millions	141.96		141.96
Total Capital Costs	C\$ Millions	840.17	61.74	901.91

Working capital costs related to the time between the shipment from the site and the receipt of payment for the products is not included in the capital estimate in Table 21-1, but is included in the Project cash flow.

CAPITAL COST EXCLUSIONS

The capital costs do not include:

- Costs to obtain permits
- Costs for feasibility study
- Project financing and interest charges
- Escalation during construction
- GST/HST
- Any additional civil, concrete work due to the adverse soil condition and location
- Import duties and custom fees
- Costs of fluctuations in currency exchanges
- Sunk costs
- Pilot Plant and other testwork
- Corporate administration costs in Delta and Toronto

- Exploration activities
- Salvage value of assets
- Severance cost for employees at the cessation of operations

CAPITAL COST ESTIMATE DETAILS

MINE AND SURFACE CAPITAL COST ESTIMATE

Mine and surface capital costs shown in Table 21-2, are based upon recent budget quotations and estimates from public sources.

TABLE 21-2 MINE AND SURFACE CAPITAL COST ESTIMATE
Avalon Rare Metals Inc. – Thor Lake Project

Item	Units	Yr 1-3	Yr 3-23	LOM
Underground Mobile Equipment	C\$ Millions	19.99	(6.00)	13.99
Underground Development	C\$ Millions	22.11	4.05	26.16
Underground Services	C\$ Millions	18.75	-	18.75
Surface Equipment	C\$ Millions	9.60	-	9.60
Infrastructure	C\$ Millions	26.47	-	26.47
Sustaining Capital	C\$ Millions	-	19.00	19.00
Total	C\$ Millions	96.91	17.05	113.97

The mine equipment will be purchased through the preproduction period with the equipment to be used for the mine development with contract operators and subsequently to be used by company personnel for operations. RPA increased the PFS costs for mobile equipment by 5%, based on recent quotations from manufacturers.

For mine development, the PFS unit costs were updated by Avalon based upon an estimate presented by a Canadian contractor. The new unit costs were applied to the new development schedule. Stope production is not included in the capital development period as capital development is planned to be stopped at the stope entrance.

Raise development costs for the ventilation raise and the ore pass were based upon the use of an Alimak raise climber and the costs were based on an estimate from TMCC.

Underground services include the mine power and ventilation systems as well as a paste backfill distribution system. The underground crusher excavations are included in the

mine development costs but the purchase and installation of the crusher and ore conveyor are included in the mill capital cost estimate.

SURFACE INFRASTRUCTURE AND EQUIPMENT

The surface equipment has been estimated as a mixture of new and used equipment. Equipment such as the grader and cranes, which will not see extensive heavy service, will be purchased used. Wherever possible the use of good used equipment for this support fleet would be evaluated and used in place of new units.

This infrastructure includes all of the roads, yards, airstrip, camp, power and supplies storage needs for TLP including the materials handling requirements at Great Slave Lake. The camp has been estimated on the basis of a new camp and the power supply system is a new modular system based on the Caterpillar 3516HD diesel generators.

CONCENTRATOR

Concentrator capital costs were taken from the PFS estimate by Melis, based upon the costs factored against installed equipment cost. A summary of the capital cost estimate is shown in Table 21-3.

TABLE 21-3 CONCENTRATOR CAPITAL COST ESTIMATE

Avalon Rare Metals Inc. – Thor Lake Project

Thor Lake Process Facility	Units	Yr 1-3	Yr 3-23	LOM
Flotation Plant	C\$ Millions	128.25	-	128.25
Capital Spares & Inventory	C\$ Millions	5.32	-	5.32
TLP Tailings Management Facility	C\$ Millions	9.09	-	9.09
Reagents (first fills)	C\$ Millions	9.32	(32.97)	(23.64)
Fuel (first fills)	C\$ Millions	18.70	-	18.70
Primary set of Containers	C\$ Millions	11.13	-	11.13
Second set of Containers	C\$ Millions	33.40	-	33.40
Sustaining Capital	C\$ Millions	-	38.00	38.00
Total	C\$ Millions	215.22	5.03	220.26

The Thor Lake tailings facility design was completed by Knight Piésold who provided the material quantities for the tailings area. RPA has provided the unit cost estimates for the

work to generate the cost estimate. The tailings facility will be constructed in two separate phases.

Containers for the concentrate movement between the TLP and Pine Point have been specified as 45 t capacity containers. Two sets of containers will be required (one at Pine Point and one at the TLP).

For the start of operations at Thor Lake a supply of reagent and fuel will be required. RPA has included a full year of reagents and fuel to ensure that there is not a reduction in production due to a lack of fuel or reagents.

HYDROMETALLURGICAL PLANT

The hydrometallurgical plant capital estimate prepared by Melis for the PFS. The plant cost was based on the use of new equipment. An acid plant will be built at the Pine Point site and the cost estimate for the acid plant is based on a quotation by a sulphuric acid plant supplier. A capital estimate summary for the Pine Point site is shown in table 21-4.

The Pine Point tailings facility design was completed by Knight Piésold who provided the material quantities and cost estimates for the tailings area.

TABLE 21-4 HYDROMETALLURGICAL PLANT CAPITAL COST ESTIMATE
Avalon Rare Metals Inc. – Thor Lake Project

Pine Point HydroMet	Units	Yr 1-3	Yr 3-23	LOM
HydroMet Plant	C\$ Millions	194.39	-	194.39
Sulphuric Acid Plant	C\$ Millions	90.71	-	90.71
Support Equipment	C\$ Millions	5.17	-	5.17
Capital Spares & Inventory	C\$ Millions	3.50	-	3.50
PP Tailings Management Facility	C\$ Millions	6.20	2.66	8.86
Sustaining Capital	C\$ Millions	-	41.00	41.00
Total	C\$ Millions	299.97	43.66	343.63

A mobile fleet will be required at Pine Point to support the hydrometallurgical plant operations and for the transportation of goods to and from the dock throughout the year.

For the Pine Point operations there is the flexibility to hire certain equipment as needed from contractors in Hay River or Fort Resolution.

INDIRECT COSTS

The indirect costs are estimated to be C\$80.7 million as summarized in Table 21-5. Engineering for the facilities and operations will be carried out through the permitting and the construction phases. Engineering costs for the completion of the detailed engineering are included in this estimate.

TABLE 21-5 INDIRECT COST ESTIMATE
Avalon Rare Metals Inc. – Thor Lake Project

Area	Units	Yr 1-3	Yr 3-23	LOM
Engineering PP & TLP	C\$ Millions	14.64	-	14.64
Procurement PP & TLP	C\$ Millions	8.12	-	8.12
Construction Management TLP	C\$ Millions	21.56	-	21.56
Owners Costs	C\$ Millions	13.50	-	13.50
Construction Freight to TLP	C\$ Millions	6.32	-	6.32
Construction Management PP	C\$ Millions	8.98	-	8.98
Owners Costs PP	C\$ Millions	7.56	-	7.56
Lutoda Royalty Buy-out	C\$ Millions	1.44	-	1.44
Environmental Bond	C\$ Millions	4.00	(4.00)	-
Total	C\$ Millions	86.10	(4.00)	82.10

Procurement for the Project is forecast to extend over a two year period with a crew of eight working on purchasing, expediting, payables and some level of freight handling. The construction management at Thor Lake is forecast to include a staff of eight management personnel for a two year period. After construction, some of the personnel will continue on with operations. Supervisor salary rates for this period reflect the overtime in a remote construction effort.

The construction support crew includes operators for cranes, forklifts and trucks, as well as labourers to support the construction efforts. The cost estimate includes numerous construction support items that would be rented or provided by subcontractors in a less remote location.

The Owners costs include an Owner's team of 15 staff for a full year prior to the commencement of operations. Travel for the team R&R is included. Charter air craft flights to the site from Yellowknife are included on the basis of two flights per week over a two-year period, the rate is suitable for a Twin Otter or King Air aircraft. The Twin Otter offers a larger payload and more personnel capacity.

Catering for the site crews will be contracted and handled by the Owner. The catering estimate is based on 100 men on site for two full years at a rate of C\$40.64 per manday based on recent camp operating costs for similar size camps. Camp power is included as a 500 kW draw for camp operations over a two year period at a cost of C\$0.24/kW-hr.

Employee induction and safety training is proposed by Avalon and the cost of a 40 hour course for an estimated 150 total staff at an average cost of C\$30 per hour. In addition a labour cost for operating personnel brought to site in advance of the "start up" has been included. The estimate is based upon a crew of 80 for a one month period. Costs for the recruitment of the operating team are included.

Freight costs for the mill and hydrometallurgical plants are carried in those individual capital estimates. The container freight costs for the concentrate containers are included in the container costs. The freight costs covered in this area are for the mine and services materials as well as the barging of material and fuel over the two summer seasons of construction. The third summer barge lift is covered in the operating costs.

The environmental bond is estimated to be C\$11 million for the Thor Lake and Pine Point sites. It is assumed that the Murphy Royalty will be bought out prior to the commencement of construction.

The cost estimate includes a contingency allowance of 20.3%. RPA considers this to be a minimum level of contingency for the Project at the current state of planning and development.

OPERATING COST ESTIMATE

The operating cost estimate from the PFS was reviewed and modified for increases in labour, fuel and supplies. The PFS estimate was compiled from work by Melis (flotation

plant costs), J.R. Goode and Associates (hydrometallurgical plant costs) and RPA (mining and other costs). The average LOM operating costs and the annual estimated operating costs are shown in Table 21-6. The LOM average operating cost includes mining, processing at site and at the hydrometallurgical plant, and freight of the product to a point of sale.

TABLE 21-6 OPERATING COST ESTIMATE
Avalon Rare Metals Inc. – Thor Lake Project

	Annual Operating Cost (C\$ millions)	Life of Mine Average (C\$/t milled)
Thor Lake		
Mining	27.4	38.54
Processing (Power Removed)	18.8	26.51
Surface Services	4.6	6.54
Administration	8.2	11.49
Power	21.3	29.91
Summer Freight	7.4	10.73
Pine Point		
Processing	94.7	130.31
Surface Services	1.3	1.99
Administration	1.4	1.76
Sales & Marketing	8.0	11.28
Total Operating Costs	193.1	269.07

Operating costs in this section, including the costs at Pine Point, when shown on a per tonne basis are per tonne of ore milled at Thor Lake.

OPERATING COST EXCLUSIONS

The operating costs do not include:

- Any provision for inflation
- Any provision for changes in exchange rates
- GST/HST
- Preproduction period expenditures
- Corporate administration and head office costs in Delta and Toronto
- Site exploration costs or infill drilling or development for conversion of additional resources to Mineral Reserves.

OPERATING COST ESTIMATE DETAILS

The operating costs are in Q1 2010 Canadian dollars, with some more recent adjustments applied to labour, fuel, and supplies. Annual budgets were prepared on a

monthly basis to reflect the seasonal fuel use on mine air heating and the summer freight lift and concentrate shipping. Other operating activities have not been adjusted for seasonal impacts.

SALARY AND LABOUR RATES

Salary and wage rates were generated by Avalon for the PFS and were based on an analysis of wage and salary surveys followed by the selection of specific rates for the project. Based upon the interpretation of the NWT 2% payroll tax, the tax is estimated as a 1.8% tax on the loaded wage and salary costs.

For the Pine Point site the wages have been multiplied by a factor of 0.9 reflecting a projected reduction in labour costs related to the nature of the work and the location. RPA considers this to be a cost risk, as RPA expects that it will be difficult to attract skilled operators, maintenance and technical personnel to live in Hay River and commute daily to a job in Pine Point.

For the UPFS, all labour costs were increased by 5% from the PFS estimate.

FUEL PRICE AND FUEL TAXES

The operating costs are based upon a diesel fuel price of C\$0.91/L FOB site, based upon NTCL Q2 2011 rack rate for diesel fuel deliveries to the mines in the Canadian north. Freight costs from Hay River to Thor Lake are included in the summer freight costs.

The NWT has a fuel tax on diesel used for mobile equipment and for power generation. RPA has included the fuel tax allowance of \$0.091/L for mobile equipment and C\$0.031/L for diesel used in power generation. Appropriate record keeping will need to be set up and maintained to substantiate apportioning of the diesel consumed at the site.

Propane has been included at a cost of C\$0.43/L. RPA considers this to be a cost risk as propane prices vary over a wide range. Avalon will benefit from purchasing an annual supply of propane in the summer months when propane demand is lower.

MINE

The mine costs are based on a combination of quotations for certain mine supplies, and experience from similar operations for the estimate of mine manpower and maintenance

required for the mobile equipment fleet. Mine costs include all of the underground mining costs except for crusher operation which is included in the mill operating costs estimate. The costs are summarized in Table 21-7.

TABLE 21-7 UNDERGROUND MINE COST SUMMARY
Avalon Rare Metals Inc. – Thor Lake Project

Area	Budget Cost per tonne	Annual Budget C\$ millions
Development	0.70	0.5
Stoping	4.75	3.5
Backfill	8.21	6.0
Mine G&A	4.19	3.1
Operating Labour	8.97	6.5
Maintenance labour	5.29	3.9
Fuel	2.97	2.2
Equipment and Supplies	2.42	1.8
Total	37.50	27.4

The key mine supplies are explosives, ground support, fuel and propane for mine air heat. Mine power costs are included in the overall power cost estimate for the site which is described below.

Explosives costs are based on the use of ANFO as the main explosive with an allowance of 10% for packaged slurry explosives and the use of Nonel detonators. Explosive usage is estimated to be 0.8 kg/ tonne.

Fuel consumption in the mine was estimated to be 1.3 million litres per year. The propane cost was estimated as C\$0.43 per litre. The annual consumption for mine air heating is estimated to be 2.2 million litres per year.

Salary and wages have been included as single line items and have not been allocated to the various activities in the mine.

Paste fill placement is included in the mine costs at a cement addition rate of 4% and a cost of C\$260/t of cement delivered to the site. The annual cement requirement is forecast to be 23,000 tonnes.

MILL

PFS mill operating costs were estimated by Melis. When collating the operating cost estimate, RPA deducted the power cost from the estimate by Melis and included the power costs as a single budget line item. An allowance for the NWT payroll tax was also added.

UPFS adjustments include a 5% increase on labour costs, and a 5% increase in reagent costs, reflected in Table 21-8, below:

TABLE 21-8 MILL COST DETAILS
Avalon Rare Metals Inc. – Thor Lake Project

	Budget Cost per tonne	Annual Budget C\$ millions
Mill Labour	8.44	6.2
Reagents	10.31	7.5
Comminution Media	5.10	3.7
Maintenance Consumables Allowance	1.91	1.4
Total	25.76	18.8

PFS Notes by Melis:

1. The estimated operating costs are based on the listed line items identified to the level of detail available for the pre-feasibility. The accuracy of the operating cost estimate is considered at a pre-feasibility level only in keeping with the +/- 25% level of accuracy of the overall pre-feasibility study.
2. The operating personnel costs are based on the minimum number of operating and maintenance personnel required to operate the facility using experienced workers, and on salaries provided by Avalon.
3. The reagent and comminution media costs, based on first quarter 2010 budget pricing obtained from suppliers, include an operating period freight cost from Edmonton to Thor Lake site of \$90/tonne provided by Avalon.
4. The reagent costs are based on average mid-range consumptions provided by Avalon. The minimum and maximum ranges provided in this report imply that the reagent cost is more appropriately noted as \$9.79/tonne ± \$2.50/tonne.
5. Two percent of capital cost of equipment, excluding crushers, grinding mills, screens and building.
6. Based on electrical power cost of \$0.22/kWh at the Thor Lake site (Dennis Bergen email dated January 26, 2010; this cost was adjusted slightly upward to \$0.228/kWh at the May 5, 2010 review meeting which brings the \$14.55/tonne power cost up to \$15.08/tonne, an increase of \$0.53/tonne).
7. The operating power was estimated at an average of 54% of peak power demand. Every 5% increase in the average operating power would increase the operating cost by \$1.35/tonne.
8. Heating is assumed to be provided by waste heat from power generation and process equipment.

THOR LAKE SURFACE

The Thor Lake surface costs include the operation and maintenance of the camp and surface facilities (but not the power house) and the operation of the surface equipment for the maintenance of roads and movement of materials and supplies excluding the summer barge lift costs and the associated handling of concentrate, fuel and freight. The annual Thor Lake surface budget is shown in Table 21-9.

TABLE 21-9 SURFACE PLANT COSTS
Avalon Rare Metals Inc. – Thor Lake Project

	Budget Cost per tonne	Annual Budget C\$ millions
Labour	4.95	3.6
Equipment	0.33	0.2
Other	1.08	0.8
Total	6.36	4.6

UPFS adjustments include a 5% increase in labour costs.

THOR LAKE ADMINISTRATION

The administrative costs for the Thor Lake site cover the mine site administration on the basis that the operation is a stand-alone site with site management, purchasing, payroll and accounts payable handled by site personnel. Health and safety and environment are also included in the mine administration. The administrative cost estimate is summarized in Table 21-10.

UPFS adjustments include a 5% increase in labour costs.

TABLE 21-10 ADMINISTRATION COSTS
Avalon Rare Metals Inc. – Thor Lake Project

	Budget Cost per tonne	Annual Budget C\$ millions
Labour	2.58	1.9
Service	7.47	5.4
Warehouse	0.70	0.5
Freight & expediting	0.41	0.3
Total	11.17	8.1

Crew transportation costs are included on the basis of Yellowknife as the point of hire for Thor Lake personnel with two charter flights per week between the site and Yellowknife using a Twin Otter aircraft to carry freight and personnel. There is also an allowance for the transportation of a number of staff to and from locations in southern Canada.

SALES AND MARKETING

Sales and marketing costs cover the sales manager and personnel to manage the loading and handling of product in Hay River. There are allowances for sales related

travel and activities and an estimate for the cost of freight from Pine Point to a port in China. Product freight costs are based on truck haulage to Hay River and then rail shipment to Vancouver or Chicago. Shipments bound for China would be re-handled in Vancouver and loaded from box cars into containers for shipment by sea. The product shipping cost estimate details are shown in Tables 21-11 and 21-12.

TABLE 21-11 SALES AND MARKETING COSTS

Avalon Rare Metals Inc. – Thor Lake Project

	Budget Cost per tonne	Annual Budget C\$ millions
Administration Staff incl.O/H	0.42	0.3
Travel and Communications	0.44	0.3
Warehouse Staff incl. O/H	0.24	0.2
Freight	10.94	7.2
Total		8.0

A summary of the product shipping costs is shown in Table 21-12. The costs are based upon the average concentrate tonnages planned to be generated from the plant at Pine Point. The costs are based on shipping by truck to Hay River where all products will be transferred to rail cars for shipping to either Vancouver or Chicago by rail. Chicago is considered to be one of the delivery points from this analysis. Products shipped to Vancouver will be repackaged in containers for shipment by sea to China. For the purpose of this study it was assumed that the ZrO_2 would go to Chicago and the REO products will go to China. The REO, niobium and ZrO_2 will be packaged in plastic supersacks while the tantalum will be packaged in 205 L steel drums. All products will be palletized at Pine Point.

Rail shipping costs are based on CN quoted rates from Hay River to either Chicago or Vancouver. There is no plan to re-establish the rail line connecting Pine Point and Hay River. Load limits are applicable to the northern section of the rail line in the summer season. In the summer the allowable load per rail car is estimated to be 63.9 t while in winter this rises to 85.7 t for an annual average of 73 t per rail car. The load limits are summarized in Table 21-13.

TABLE 21-12 PRODUCT SHIPPING COST ESTIMATE DETAILS
Avalon Rare Metals Inc. – Thor Lake Project

Item	Units	Quantities
Products		
REO Concentrates	t	13,755
Nb ₂ O ₅	t	2,503
ZrO ₂	t	32,062
Ta ₂ O ₅	t	139
	t	48,459
Cost per tonne		
REO Concentrates	\$	145.47
ZrO ₂	\$	155.56
Nb ₂ O ₅	\$	145.47
Ta ₂ O ₅	\$	931.47
Annual Cost		
REO Concentrates	\$	2,000,916
ZrO ₂	\$	389,432
Nb ₂ O ₅	\$	4,663,961
Ta ₂ O ₅	\$	129,270
Annual Total	\$	7,183,579

TABLE 21-13 RAIL CAR LOAD LIMITS
Avalon Rare Metals Inc. – Thor Lake Project

	Units	Summer	Winter
Allowable Load on Rail Line	lbs	220,000	268,000
Empty Car Weight	lbs	79,500	79,500
Allowable Freight Load	lbs	140,500	188,500
Freight Load Limit Per Car	Short tons	70.25	94.25
Freight Load Limit Per Car	Metric tonnes	63.86	85.68
Annual Average Load Per Car	Metric tonnes	72.95	

The shipping cost from Pine Point to Hay River is estimated to be C\$5.00 per tonne. This rate is based upon some level of back haul capability from trucks hauling freight into the plant at Pine Point. The transloading in Hay River is included in the sales operating cost details and will be handled by company employees working in Hay River. The rail cost estimate was C\$6,673 per car from Hay River to Vancouver and C\$9,233 from Hay River to Chicago.

Bags and pallets are included at C\$12/t each (\$12 each). Pallets will be treated and certified as required for international shipment into China. Container loading in Vancouver is estimated to cost C\$10 per tonne and ocean freight is included at C\$15 per tonne. The costs of shipping REO to China are summarized in Table 21-14, and the costs of shipping REO to Chicago are summarized in Table 21-15.

TABLE 21-14 REO SHIPPING TO CHINA
Avalon Rare Metals Inc. – Thor Lake Project

Shipping Stage	C\$/t
Pine Point to Hay River	5.00
Load in Hay River	In operating cost
Rail to Vancouver	91.47
Bags	12.00
Pallets	12.00
Transfer in Vancouver	10.00
Sea Freight	15.00
Cost per tonne of product	145.47

There is no significant difference between the cost of shipping to Chicago or to a port in China. At this time, there are no sales contracts in place and accordingly the shipping costs may vary depending upon the sales contracts that are to be negotiated.

TABLE 21-15 REO SHIPPING TO CHICAGO
Avalon Rare Metals Inc. – Thor Lake Project

Shipping Stage	C\$/t
Pine Point to Hay River	5.00
Load in Hay River	In operating costs
Rail to Chicago	126.56
Bags	12.00
Pallets	12.00
Cost per tonne of product to Chicago	155.56

For tantalum the shipping is planned to be in 205 L steel drums. The costs of the drums are C\$150 per tonne of tantalum product and it is estimated that there will be five pallets per tonne for a cost of C\$60/t product. The total shipping cost of the tantalum is estimated to be C\$931 per tonne of product as shown in Table 21-16.

TABLE 21-16 TANTALUM SHIPPING TO CHINA
Avalon Rare Metals Inc. – Thor Lake Project

Shipping Stage	C\$/t
Pine Point to Hay River	5.00
Load in Hay River	In operating cost
Rail to Vancouver	91.47
Barrels	750.00
Pallets	60.00
Transfer in Vancouver	10.00
Sea Freight	15.00
Cost per tonne of product	931.47

RPA notes that these costs are subject to revision as sales contracts are made and as rates for shipping are negotiated with suppliers.

POWER – THOR LAKE

Power for the Thor Lake site will be generated with diesel units, the operating costs are based on the generation of 0.27 kW-hr of electrical power per litre of fuel and the installation of power factor management facilities to run a power factor near unity. The annual power generation operating costs are shown in Table 21-17. With eight engines installed and their use rotated, there will be no overhauls in the first year. Operating costs include an allowance for the average annual overhaul costs starting in the second year.

TABLE 21-17 POWER GENERATION COSTS
Avalon Rare Metals Inc. – Thor Lake Project

Description	Annual Budget
General Materials	80,000
Generator Rebuilds	300,000
Mech/Elect Repair Parts & Materials	36,000
Diesel Fuel	20,533,129
Lubricants & Grease	120,000
Total	21,069,129
Cost per tonne	\$28.86
GW-hrs generated	80.7
Cost per kW-hr	\$0.26

The annual fuel requirement for power generation at Thor Lake is 21.8 million litres.

SUMMER FREIGHT

The details of the annual summer freight costs are shown in Table 21-18. This cost area includes the annual barge charters for both the docks at Pine Point and Thor Lake, the tug and barge charters for hauling material and the materials handling costs for goods and concentrate at Pine Point and Thor Lake. Materials at Thor Lake will be offloaded and then moved up to the plant site.

TABLE 21-18 SUMMER FREIGHT COSTS
Avalon Rare Metals Inc. – Thor Lake Project

Description	Annual Budget
Surface Costs of Freight Handle	1,051,440
Board	48,000
Barging	5,290,876
Set up	66,200
Extra Time for Barge to Fuel	373,646
Annual Dock Installation and Removal	600,917
Total	7,431,078
Cost per tonne	\$10.18

The surface costs at Thor Lake include the costs to move material and concentrate at Thor Lake and Pine Point. This work will be seasonal but will require heavy lift forklifts and transport trucks at both Pine Point and Thor Lake.

At 2,000 tpd and based on the forecast concentrate production there will be 24 barge trips per season. Based on a cycle time of 32 hours for sailing and docking with a 20% contingency on the time there will be 38 days of sailing time per season plus an estimated 6 days of standby for weather delays. Barge costs are based on charter rates of C\$27,500 per day for the tug and C\$3,000 per barge per day. It is estimated that with the barges serving as docks there will be 19 barges under charter. The barge costs of C\$2.65 million per season include C\$1.64 million for operating charter time, C\$0.43 million for standby and delays and C\$0.50 million for annual mobilization of the barges and tug.

The extra travel for fuel trips will add C\$224,000 per season and the delivery and set up of the barge docks at Pine Point and Thor Lake will cost C\$600,000 per year. Fuel will come in on barges loaded at Hay River, this will require an extra leg on several voyages per season to go from Pine Point to Hay River for fuel. At Thor Lake the fuel will be offloaded to storage tanks at Great Slave Lake. From there the fuel will be hauled by fuel trucks to the main storage tank farm at Thor Lake. It is estimated the barges can take approximately two million litres of fuel each so that 6 million litres can be brought in at a time.

Other supplies and freight will be handled as large cargo on deck or in standard sea containers for shipment to Thor Lake.

PINE POINT ADMINISTRATION

The Pine Point administration costs cover the Pine Point site administration functions such as payroll and payables will be shared between the two sites and that receivables would be handled by staff at Pine Point. Employee transportation cost allowances are included for daily transportation between the site and Fort Resolution and Hay River as there is no accommodation planned for the Pine Point site. Health and safety and environment are also included in the site administration. The annual budget estimate is shown in Table 21-19.

TABLE 21-19 PINE POINT ADMINISTRATION COSTS
Avalon Rare Metals Inc. – Thor Lake Project

Description	Cost per tonne ore	Annual Budget
Administration Labor	0.78	566,395
Administrative Services	0.72	528,000
Warehouse Labour	0.35	255,128
Freight	0.08	60,000
Total	1.93	1,409,523

PINE POINT - SURFACE

The Pine Point surface costs include the operation and maintenance of the surface facilities and the maintenance and operation of the surface equipment for the maintenance of roads and movement of materials and supplies. Surface costs at Pine Point are estimated to total \$1,247,835 per year in the operating budget or \$1.71 per tonne of ore milled.

HYDROMETALLURGICAL PLANT

The hydrometallurgical plant operating costs are estimated to be as shown in Table 21-20.

TABLE 21-20 HYDROMETALLURGICAL PLANT COSTS
Avalon Rare Metals Inc. – Thor Lake Project

Description	Cost per tonne	Annual Budget
Tonnage dependent costs	57.32	41,845,308
Product dependent costs	35.94	26,235,934
Annual costs	13.56	9,898,631
Make up power costs	0.48	348,009
Acid costs	22.27	16,254,416
Payroll tax	0.20	144,585
Total	129.76	94,726,973

The hydrometallurgical plant includes a contractor-supplied and -operated sulphuric acid plant, which is included in the capital and operating costs for the annual production of 248,000 tonnes of sulphuric acid. Power at Pine Point is assumed to be taken from the existing grid with some annual make up from diesel generation.

22 ECONOMIC ANALYSIS

A Cash Flow Projection has been generated from the LOM production schedule, capital and operating cost estimates and product price assumptions, and is summarized in Table 22-2. A summary of the key criteria is provided below.

TAXES

The NWT diesel tax has been included in the operating and capital cost estimates. The NWT 2% payroll tax has been applied as 1.8% of the gross payroll for the capital and operating phases of the project. The payroll tax is applicable to all wages and bonuses but is not applied to pension contributions and certain benefits.

There is a NWT mining royalty payable on the “value” of mineral production in the NWT. The royalty is based upon the operating cashflow less a development allowance, depreciation and a processing allowance. The value of output thus calculated is subject to a royalty of the lesser of 13% of the value or the sum as shown in Table 22-1.

TABLE 22-1 NWT MINING ROYALTY
Avalon Rare Metals Inc. – Thor Lake Project

Range	Rate (%)
On the first \$10,000	0
In excess of \$10,000 but less than \$5,000,000	5
In excess of \$5,000,000 but less than \$10,000,000	6
In excess of \$10,000,000 but less than \$15,000,000	7
In excess of \$15,000,000 but less than \$20,000,000	8
In excess of \$20,000,000 but less than \$25,000,000	9
In excess of \$25,000,000 but less than \$30,000,000	10
In excess of \$30,000,000 but less than \$35,000,000	11
In excess of \$35,000,000 but less than \$40,000,000	12
In excess of \$40,000,000 but less than \$45,000,000	13
In excess of \$45,000,000	14

The project income will be subject to federal and NWT income tax. The federal income tax rate is 15% and the NWT tax rate is 11.5%.

RPA has relied on Avalon for guidance on the estimation of depreciation and for tax calculations. RPA notes that the taxation issues are complex, but is of the opinion that the calculations and assumptions are appropriate for the Project.

ECONOMIC CRITERIA

PRODUCTION

- Mineral Reserves of 14.54 Mt at an average grade of 1.53% TREO, 0.38% Nb₂O₅, 2.90% ZrO₂ and 0.040% Ta₂O₅.
- Underground mining using a combination of cut and fill, and long hole stoping.
- Two years of construction followed by 20 years of production at 2,000 tpd of ore.
- Production of a bulk flotation concentrate containing REO, ZrO₂, Ta₂O₅ and Nb₂O₅ at Thor Lake.
- Barging 130,000 tonnes of concentrate across the Great Slave Lake to Pine Point annually in the summer.
- Hydrometallurgical extraction of TREO, ZrO₂, Ta₂O₅ and Nb₂O₅ at Pine Point.

REVENUE

- Concentration and Hydrometallurgical recoveries as indicated by testwork
- Metal price:
 - Independent, third-party forecasts for 2015, based on supply and demand projections from 2011 to 2015
 - No inflation after 2015 (assumed commencement of production)
 - Average price per kg of REE is US\$46.31
- Revenue is 69% from TREO, 15% from Nb₂O₅, 12% from ZrO₂ and 4% from Ta₂O₅.
- An exchange rate of C\$0.95/US\$
- Revenue is recognized at the time of production at the hydrometallurgical plant.

COSTS

- Pre-production capital of C\$840 million
- Life of mine capital of C\$902 million
- Average life of mine operating cost of C\$269/t (mine, mill and hydrometallurgical plant)

TAXES AND ROYALTIES

- NWT mining royalty on value of minerals extracted
- Federal tax rate of 15% and a territorial tax rate of 11.5%

TABLE 22-3 CASH FLOW SUMMARY
Avalon Rare Metals Inc. – Thor Lake Project

		Total	Year -2	Year -1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21
MINING																									
Operating Days	tpd				365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365
Plant Throughput	000 tonnes	14,539	1,833	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	
Ore Mined	000 tonnes	14,539	669	730	730	730	730	730	730	730	730	730	730	730	730	730	730	730	730	730	730	730	730	730	730
TREO	ppm	15,337	18,949	19,209	18,318	18,540	16,211	16,332	15,217	14,031	14,314	13,570	13,290	14,608	13,555	14,683	13,877	14,392	14,714	13,665	13,905	15,667	15,667	15,667	
Nb ₂ O ₅	ppm	3,780	4,542	4,646	4,434	4,391	3,830	3,930	3,567	3,466	3,589	3,382	3,357	3,629	3,512	3,652	3,491	3,796	3,880	3,405	3,299	3,872	3,872	3,872	
Ta ₂ O ₅	ppm	414	536	539	519	506	412	439	382	368	387	361	340	401	383	376	356	396	414	367	375	430	430	430	
ZrO ₂	ppm	28,998	35,406	36,383	33,438	34,106	28,620	29,644	26,353	25,320	26,937	24,525	22,568	28,525	26,421	28,399	24,481	30,087	32,294	27,225	27,753	32,003	32,003	32,003	
CONCENTRATION – THOR LAKE																									
Ore Milled	000 tonnes	14,539	669	730	730	730	730	730	730	730	730	730	730	730	730	730	730	730	730	730	730	730	730	730	730
TREO	ppm	15,337	18,949	19,209	18,318	18,540	16,211	16,332	15,217	14,031	14,314	13,570	13,290	14,608	13,555	14,683	13,877	14,392	14,714	13,665	13,905	15,667	15,667	15,667	
Nb ₂ O ₅	ppm	3,780	4,542	4,646	4,434	4,391	3,830	3,930	3,567	3,466	3,589	3,382	3,357	3,629	3,512	3,652	3,491	3,796	3,880	3,405	3,299	3,872	3,872	3,872	
Ta ₂ O ₅	ppm	414	536	539	519	506	412	439	382	368	387	361	340	401	383	376	356	396	414	367	375	430	430	430	
ZrO ₂	ppm	28,998	35,406	36,383	33,438	34,106	28,620	29,644	26,353	25,320	26,937	24,525	22,568	28,525	26,421	28,399	24,481	30,087	32,294	27,225	27,753	32,003	32,003	32,003	
Concentrator Mass Pull	%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%
Flotation Concentrate	000 dmt	2,617	120	131	131	131	131	131	131	131	131	131	131	131	131	131	131	131	131	131	131	131	131	131	
Moisture Content in Conc.	%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	
Wet Weight of Flotation Conc.	000 wmt	2,879	132	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	145	
Flotation Recovery																									
TREO	%	79.5%	79.5%	79.5%	79.5%	79.5%	79.5%	79.5%	79.5%	79.5%	79.5%	79.5%	79.5%	79.5%	79.5%	79.5%	79.5%	79.5%	79.5%	79.5%	79.5%	79.5%	79.5%	79.5%	
Nb ₂ O ₅	%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	
Ta ₂ O ₅	%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%	63.0%	
ZrO ₂	%	89.7%	89.7%	89.7%	89.7%	89.7%	89.7%	89.7%	89.7%	89.7%	89.7%	89.7%	89.7%	89.7%	89.7%	89.7%	89.7%	89.7%	89.7%	89.7%	89.7%	89.7%	89.7%	89.7%	
HYDROMETALLURGY – PINE POINT																									
Plant Feed	000 tonnes	2,617	60	126	131	131	131	131	131	131	131	131	131	131	131	131	131	131	131	131	131	131	131	131	
TREO Recovery	%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	
Nb ₂ O ₅ Recovery	%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	
Ta ₂ O ₅ Recovery	%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	
ZrO ₂ Recovery	%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	
Production																									
TREO	tonnes	164,869	4,687	9,871	10,127	9,947	9,378	8,782	8,514	7,893	7,649	7,525	7,249	7,529	7,600	7,620	7,707	7,629	7,855	7,658	7,440	7,980	4,228		
Nb ₂ O ₅	tonnes	30,296	838	1,772	1,827	1,775	1,654	1,561	1,508	1,415	1,420	1,403	1,356	1,405	1,437	1,441	1,437	1,466	1,544	1,466	1,349	1,443	779		
Ta ₂ O ₅	tonnes	1,895	56	118	122	118	105	98	94	86	87	86	81	85	87	84	86	93	90	85	93	49	40		
ZrO ₂	tonnes	340,360	9,564	20,284	20,574	19,903	18,483	17,168	16,500	15,226	15,398	15,164	13,877	15,055	16,191	16,154	15,582	16,079	18,382	17,538	16,200	17,608	9,430		
Total Tonnage Sold	tonnes	537,420	15,145	32,046	32,649	31,743	29,621	27,610	26,617	24,621	24,554	24,177	22,562	24,075	25,317	25,302	24,810	25,261	27,874	26,752	25,074	27,124	14,487		
REVENUE																									
Prices																									
TREO	US\$/kg	46.31	47.52	47.54	46.96	47.38	47.08	45.96	45.60	45.79	46.81	46.15	45.07	45.87	45.92	45.19	45.45	45.74	45.80	46.20	46.66	46.76	46.92		
Nb ₂ O ₅	US\$/kg	55.86	55.86	55.86	55.86	55.86	55.86	55.86	55.86	55.86	55.86	55.86	55.86	55.86	55.86	55.86	55.86	55.86	55.86	55.86	55.86	55.86	55.86		
Ta ₂ O ₅	US\$/kg	255.63	255.63	255.63	255.63	255.63	255.63	255.63	255.63	255.63	255.63	255.63	255.63	255.63	255.63	255.63	255.63	255.63	255.63	255.63	255.63	255.63	255.63		
ZrO ₂	US\$/kg	3.77	3.77	3.77	3.77	3.77	3.77	3.77	3.77	3.77	3.77	3.77	3.77	3.77	3.77	3.77	3.77	3.77	3.77	3.77	3.77	3.77	3.77		
Revenue																									
TREO	US\$ Millions	7,636	222.75	469.28	475.57	471.27	441.52	403.54	388.23	361.42	358.06	347.27	326.69	345.34	349.00	344.37	350.30	348.94	359.74	353.82	347.16	373.16	198.37		
Nb ₂ O ₅	US\$ Millions	1,692	46.79	99.00	102.04	99.18	92.39	87.21	84.26	79.05	79.29	78.35	75.74	78.51	80.24	80.51	80.29	81.90	86.27	81.87	75.34	80.60	43.52		
Ta ₂ O ₅	US\$ Millions	484	14.43	30.26	31.08	30.12	26.97	25.01	24.14	22.04	22.17	21.98	20.60	21.76	23.02	22.30	21.52	22.10	23.81	22.98	21.82	23.66	12.64		
ZrO ₂	US\$ Millions	1,283	36.05	76.47	77.56	75.03	69.68	64.72	62.21	57.40	58.05	57.17	52.32	56.76	61.04	60.90	58.74	60.62	69.30	66.12	61.07	66.38	35.55		
Gross revenue	US\$ Millions	11,996	320.02	675.02	686.25	676.60	630.56	580.49	558.84	519.90	517.58	504.77	475.34	502.36	513.31	508.08	510.85	513.56	539.12	524.79	505.39	543.90	290.08		
Exchange Rate	C\$/US\$	1.053	1.053	1.053	1.053	1.053	1.053	1.053	1.053	1.053	1.053	1.053	1.053	1.053	1.053	1.053	1.053	1.053	1.053	1.053	1.053	1.053	1.053		
Losses in Handling	%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%		
Net revenue	US\$ Millions	11,092	319.93	674.81	686.05	675.39	630.37	580.31	558.68	519.75	517.42	504.62	475.20	502.21	513.15	507.93	510.70	513.41	538.96	524.63	505.24	543.64	290.00		
Net revenue	C\$ Millions	11,676	336.77	710.33	722.15	710.94	663.55	610.85	588.08	547.10	544.65	531.18	500.21	528.64	540.16	534.66	537.57	540.43	567.32	552.24	531.83	572.25	305.26		
Net Revenue Per Tonne Milled	C\$/t milled	803	1,007	1,062	989	974	909	837	806	749	746	728	685.220	724.169	739.944	732.411	736								

TABLE 22-2 CASH FLOW SUMMARY
Avalon Rare Metals Inc. – Thor Lake Project

		Total	Year 2	Year -1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21
OPERATING COSTS																									
Thor Lake																									
Mining	C\$ Millions	560		12.98	27.37	27.37	27.37	27.37	27.37	27.37	27.37	27.37	27.37	27.37	27.37	27.37	27.37	27.37	27.37	27.37	27.37	27.37	27.37	27.37	27.37
Processing	C\$ Millions	385		9.40	18.80	18.80	18.80	18.80	18.80	18.80	18.80	18.80	18.80	18.80	18.80	18.80	18.80	18.80	18.80	18.80	18.80	18.80	18.80	18.80	18.80
Surface Services	C\$ Millions	95		2.32	4.64	4.64	4.64	4.64	4.64	4.64	4.64	4.64	4.64	4.64	4.64	4.64	4.64	4.64	4.64	4.64	4.64	4.64	4.64	4.64	4.64
Administration	C\$ Millions	167		4.08	8.15	8.15	8.15	8.15	8.15	8.15	8.15	8.15	8.15	8.15	8.15	8.15	8.15	8.15	8.15	8.15	8.15	8.15	8.15	8.15	8.15
Power	C\$ Millions	435		10.54	21.07	21.31	21.07	21.37	21.39	21.41	21.31	21.33	21.40	21.55	21.17	21.47	21.07	21.07	21.07	21.07	21.07	21.07	21.07	21.07	21.07
Summer Freight	C\$ Millions	156			7.43	7.43	7.43	7.43	7.43	7.43	7.43	7.43	7.43	7.43	7.43	7.43	7.43	7.43	7.43	7.43	7.43	7.43	7.43	7.43	7.43
Pine Point																									
Processing	C\$ Millions	1,895		47.36	94.73	94.73	94.73	94.73	94.73	94.73	94.73	94.73	94.73	94.73	94.73	94.73	94.73	94.73	94.73	94.73	94.73	94.73	94.73	94.73	94.73
Surface Services	C\$ Millions	26		0.62	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Administration	C\$ Millions	29		0.70	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41
Sales & Marketing	C\$ Millions	164		3.99	7.99	7.99	7.99	7.99	7.99	7.99	7.99	7.99	7.99	7.99	7.99	7.99	7.99	7.99	7.99	7.99	7.99	7.99	7.99	7.99	7.99
Total Operating Costs	C\$ Millions	3,912		39.31	140.15	193.08	192.84	193.14	193.16	193.18	193.08	193.10	193.17	193.32	192.94	193.24	192.84	192.84	192.84	192.84	192.84	192.84	192.84	192.84	192.84
Cost Per Tonne Milled	C\$/t milled	269			\$ 209	\$ 264	\$ 264	\$ 265	\$ 265	\$ 265	\$ 264	\$ 265	\$ 265	\$ 265	\$ 264	\$ 265	\$ 264	\$ 264	\$ 264	\$ 264	\$ 264	\$ 264	\$ 264	\$ 264	\$ 264
Cost Per kg of Final Product	US\$/kg	6.92			\$ 8.79	\$ 5.72	\$ 5.61	\$ 5.78	\$ 6.20	\$ 6.65	\$ 6.89	\$ 7.45	\$ 7.47	\$ 7.60	\$ 8.12	\$ 7.63	\$ 7.24	\$ 7.24	\$ 7.38	\$ 7.25	\$ 6.57	\$ 6.85	\$ 7.31	\$ 6.75	\$ 4.30
OPERATING CASHFLOW		C\$ Millions	7,764	(39.31)	196.61	517.25	529.32	517.80	470.39	417.68	395.00	354.00	351.49	337.86	307.27	335.40	347.32	341.82	344.74	347.59	374.49	359.40	338.99	379.41	239.62
NWT Royalty																									
NWT Mining Royalty	C\$ Millions	783			-	-	42.98	60.92	54.74	48.10	45.11	39.74	39.37	37.55	33.54	36.04	37.47	37.76	38.09	38.42	41.88	39.88	38.51	45.43	27.30
EBITDA	C\$ Millions	6,981		(39.31)	196.61	517.25	486.34	456.88	415.65	369.58	349.89	314.27	312.12	300.31	273.74	299.37	309.85	304.07	306.64	309.16	332.61	319.53	300.48	333.98	212.33
CAPITAL COSTS																									
Mine	C\$ Millions	123.06		47.51	46.90	11.30	1.00	1.00	3.11	2.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	6.00	-	-
Concentrator	C\$ Millions	211.17		69.74	113.02	23.38	-	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	5.00	5.00	2.00	2.00	2.00	-	16.48	16.48
Hydrometallurgical Facility	C\$ Millions	343.63		54.49	147.11	98.38	2.66	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	6.00	6.00	2.00	2.00	1.00	-	-	-
Indirect Costs	C\$ Millions	80.66		44.88	35.78	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sustaining Capital	C\$ Millions	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Reclamation	C\$ Millions	-		-	1.00	3.00	4.00	1.00	2.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	(11)
Royalty Buy Out	C\$ Millions	1.44		-	-	1.44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Contingency	C\$ Millions	141.96		42.89	99.37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Capital Costs	C\$ Millions	901.91		259.49	443.17	137.51	7.66	6.00	9.11	6.94	5.00	5.00	5.00	5.00	5.00	5.00	5.00	13.00	13.00	5.00	5.00	5.00	5.00	16.48	27.48
PRE-TAX CASH FLOW																									
Net Cash Flow	C\$ Millions	6,079	(259)	(482)	59	510	480	448	409	365	345	309	307	295	269	294	305	291	294	304	328	315	305	350	240
Cumulative Cash Flow	C\$ Millions		(259)	(742)	(683)	(173)	307	755	1,164	1,528	1,873	2,182	2,489	2,785	3,053	3,348	3,653	3,944	4,237	4,542	4,869	5,184	5,489	5,840	6,079
Pre-Tax IRR	39%																								
Pre-Tax NPV	Discount Rate	C\$ millions																							
	0.0%	6,079																							
	5.0%	3,171																							
	8.0%	2,222																							
	10.0%	1,772																							
TAXATION																									
Federal Tax	C\$ (000)	\$ 907	-	-	-	-	42.32	67.44	61.29	54.68	51.73	46.39	46.06	44.29	40.31	42.95	44.53	44.86	45.25	45.62	49.14	47.18	45.82	52.57	34.32
NWT Tax	C\$ (000)	\$ 696	-	-	-	-	32.78	51.71	46.99	41.92	39.66	35.56	35.32	33.96	30.90	32.93	34.14	34.39	34.69	34.98	37.68	36.17	35.13	40.30	26.31
Total Tax	C\$ (000)	\$ 1,602	-	-	-	-	75.10	119.15	108.28	96.59	91.38	81.95	81.38	78.25	71.21	75.89	78.66	79.25	79.93	80.60	86.82	83.35	80.95	92.87	60.63
AFTER-TAX CASH FLOW																									
Net Cash Flow	C\$ Millions	4,477	(259)	(482)	59	510	405	329	300	268	254	227	226	217	198	218	226	212	214	224	241	231	225	258	179
Cumulative Cash Flow	C\$ Millions		(259)	(742)	(683)	(173)	232	561	861	1,129	1,383	1,610	1,836	2,053	2,250	2,469	2,695	2,907	3,120	3,344	3,585	3,816	4,040	4,298	4,477
After-Tax IRR	34%																								
After-Tax NPV	Discount Rate	C\$ millions																							
	0.0%	4,477																							
	5.0%	2,315																							
	8.0%	1,607																							
	10.0%	1,271																							

CASH FLOW ANALYSIS

The cash flow analysis in this report is based on the extraction of the Probable Mineral Reserves in a production plan which extends to the end of Year 20.

PRE-TAX

Considering the full Project on a stand-alone basis, the undiscounted pre-tax cash flow totals C\$6,079 million over the mine life and simple payback occurs 2.4 years after the start of production. The pre-tax IRR is 39% and the pre-tax net present value (NPV) is as follows:

- C\$3,171 million at a 5% discount rate
- C\$2,222 million at an 8% discount rate
- C\$1,772 million at a 10% discount rate

AFTER-TAX

Considering the full project on a stand-alone basis, the undiscounted after-tax cash flow totals C\$4,477 million over the mine life and simple payback occurs 2.4 years after the start of production. The after tax IRR is 34% and the after tax net present value (NPV) is as follows:

- C\$2,315 million at a 5% discount rate
- C\$1,607 million at an 8% discount rate
- C\$1,271 million at a 10% discount rate

The net revenue per kilogram of product is US\$20.64, and the cost per kilogram of product (all products) is US\$6.92. The average annual product production is 26,700 tonnes of products (8,200 tonnes of rare earth oxides).

SENSITIVITY ANALYSIS

Project risks can be identified in both economic and non-economic terms. Key economic risks were examined by running cash flow sensitivities:

- Product Prices
- Exchange Rate
- Operating costs
- Capital costs
- TREO price
- ZrO₂ price

The sensitivity of the base case after-tax 8% NPV has been calculated for -20% to +20% variations in the above noted parameters. The project NPV is most sensitive to metal price and recovery followed by foreign exchange rate, operating costs, capital costs and individual product constituent prices.

The sensitivities are shown in Figure 22-1 and Table 22-3. The sensitivities to metallurgical recovery and head grade are identical to that of price (for all constituents combined) and are therefore plotted on the same line.

FIGURE 22-1 SENSITIVITY ANALYSIS

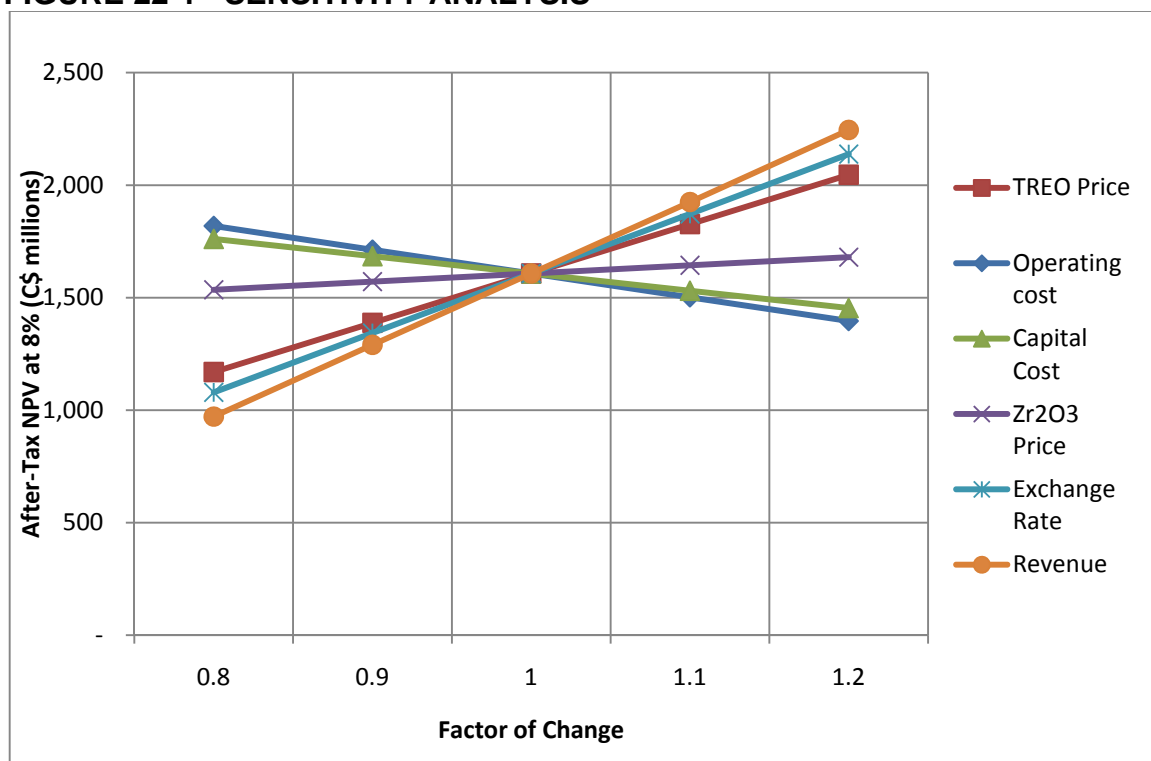


TABLE 22-3 SENSITIVITY ANALYSIS
Avalon Rare Metals Inc. – Thor Lake Project

Parameter Variables	Units	-20%	-10%	Base Case	+10%	+20%
ZrO ₂ Price	US\$/kg	3.02	3.39	3.77	4.15	4.52
TREO Price	US\$/kg	37.05	41.68	46.31	50.95	55.58
Exchange Rate	C\$/US\$	0.84	0.95	1.05	1.16	1.26
Revenue	C\$ billions	9.3	10.5	11.7	12.8	14.0
Operating Cost	C\$/tonne	215	242	269	296	323
Capital Cost	C\$ millions	722	812	902	992	1,082

NPV @ 8%	Units	-20%	-10%	Base Case	+10%	+20%
ZrO ₂ Price	C\$ millions	1,535	1,571	1,607	1,644	1,680
TREO Price	C\$ millions	1,170	1,388	1,607	1,827	2,046
Exchange Rate	C\$ millions	1,079	1,343	1,607	1,872	2,138
Revenue	C\$ millions	972	1,290	1,607	1,925	2,245
Operating Cost	C\$ millions	1,818	1,713	1,607	1,502	1,396
Capital Cost	C\$ millions	1,761	1,684	1,607	1,531	1,454

At June 17, 2010 prices, cash flow results are considerably higher. On a pre-tax basis, the undiscounted cash flow totals C\$22.16 billion over the mine life and the IRR is 102%.

The pre-tax net present value (NPV) is as follows:

- C\$9.22 billion at an 8% discount rate
- C\$7.65 billion at a 10% discount rate

On an after-tax basis, the undiscounted cash flow totals C\$16.24 billion over the mine life and the IRR is 89%. The pre-tax net present value (NPV) is as follows:

- C\$6.74 billion at an 8% discount rate
- C\$5.59 billion at a 10% discount rate

23 ADJACENT PROPERTIES

At the time of writing, there are no mineral claims or leases adjacent to the Thor Lake leases. All of the known rare metal deposits related to the Blatchford Lake Complex are owned by Avalon.

24 OTHER RELEVANT DATA AND INFORMATION

No additional information or explanation is necessary to make this Technical Report understandable and not misleading.

25 INTERPRETATION AND CONCLUSIONS

In the opinion of RPA, the UPFS indicates positive economic results can be obtained for the Thor Lake Project, in a scenario that includes underground mining, preparation of a bulk concentrate at Thor Lake, and hydrometallurgical processing at a plant to be constructed at Pine Point. The final products will be a mixed rare earth oxide concentrate, a zirconium oxide concentrate, a niobium oxide concentrate, and a tantalum oxide concentrate.

RPA is of the opinion that the current drill hole database is sufficient for generating a resource model for use in resource and reserve estimation and that the recovery and cost estimates are based upon sufficient data and engineering to support a reserve statement. Economic analysis using these estimates generates a positive cash flow, which supports a reserve statement.

Specific conclusions by area of the UPFS are as follows.

GEOLOGY AND MINERAL RESOURCES

- Mineral Resources in the Upper and Basal Zones are estimated to consist of Indicated Resources of 88.5 Mt with grades of 1.53% total rare earth oxides (TREO), 2.68% ZrO₂, 0.37% Nb₂O₅, and 0.032% Ta₂O₅ and Inferred Resources of 223.2 Mt with grades of 1.31% TREO, 2.59% ZrO₂, 0.36% Nb₂O₅, and 0.027% Ta₂O₅.
- Mineral Resources are estimated at a cut-off Net Metal Return (NMR) value of \$260 per tonne. This value was calculated using PFS price inputs.
- RPA reclassified a small quantity (330,000 tonnes, or 2% of Mineral Reserves) of Inferred Resources to Indicated.

MINERAL RESERVES

- Probable Mineral Reserves are estimated to be 14.5 million tonnes with grades of 1.53% TREO, including 0.40% heavy rare earth oxides (HREO), 2.90% ZrO₂, 0.38% Nb₂O₅, and 0.040% Ta₂O₅. Mineral Reserves were estimated at a cut-off value based on an NMR value of C\$300 per tonne. Mineral Reserves are based on a 20-year underground mine design and stope schedule. RPA notes that the defined Mineral Resources extend considerably beyond the designed underground mine.
- RPA is of the opinion that the Mineral Reserve estimates have been compiled in a manner consistent with the CIM Guidelines and in accordance with NI 43-101.

- There is potential to define additional Mineral Reserves within the current Indicated Resources. The areas not included in Mineral Reserves need only a mine design, schedule, and economic analysis.

MINERAL RESERVES

- The deposit is relatively flat-lying, and will be mined with a combination of long hole stoping and drift & fill stoping. The minimum thickness used in the development of the Mineral Reserve estimate was five metres.
- RPA considers the mining plan to be relatively simple and the mining conditions are expected to be good.
- Mining of the secondary stopes is dependent upon the use of a suitable backfill, assumed to be paste fill with 4% cement added as a binder. Initial testwork to demonstrate that a suitable paste fill can be generated has been undertaken.

PROCESSING – CONCENTRATOR

- Mineral processing testwork indicates that the TREO, ZrO_2 , Nb_2O_5 and Ta_2O_5 can be recovered in a flotation circuit after crushing and grinding to 80% minus 38 μ with recoveries of 80% of the TREO, 90% of the zirconium oxide, 69% of the niobium oxide and 63% of the tantalum oxide to a flotation concentrate. The processing circuit also includes magnetic and gravity separation stages. The design basis for the PFS was to take 18% of the feed to the concentrate.
- The concentrate will be stored in covered containers at Thor Lake and shipped to the hydrometallurgical facility at Pine Point each summer using barges to cross Great Slave Lake.
- Tailings from the flotation plant will be stored in a Tailings Management Facility (TMF) located north-east of the mill site.

PROCESSING – HYDROMETALLURGICAL PLANT

- Metallurgical process testwork for the extraction of the TREO, zirconium oxide, niobium oxide and tantalum oxide from the flotation concentrate was carried out and the recoveries of 96% of the TREO, 93% of the zirconium oxide, 82% of the niobium oxide and 60% of the tantalum oxide were demonstrated in the laboratory.
- The hydrometallurgical plant will consist of a concentrate “cracking” process, using a combination of acid baking, caustic cracking, and leaching using sulphuric acid and sodium hydroxide as the primary reagents.
- The hydrometallurgical process plant will consume a significant quantity of reagents, which are brought to site by rail to Hay River and then by truck to the plant. A stand-alone sulphuric acid plant is included to provide acid for the process.

- The products from the hydrometallurgical plant will be a mixed rare earth oxides concentrate, and separate zirconium oxide, niobium oxide and tantalum oxide concentrates.
- The products will be shipped in one tonne capacity plastic sacks on pallets (or steel drums for the tantalum oxide) and will be taken by truck to the rail head at Hay River and then by rail to Vancouver or to a central location in the USA.
- Pine Point was selected as a reasonable location within the NWT for the hydrometallurgical facility, due to the existing disturbance at the brown-field site, reasonable logistics for concentrate and reagent transportation, and access to infrastructure. Both Avalon's aboriginal partners and the Government of the NWT have expressed a preference for keeping the hydrometallurgical plant in the north. In RPA's opinion, however, the cost of transporting the required reagents outweighs the cost of transporting the concentrate further south, and the Project is incurring an economic disadvantage by assuming a northern location for the hydrometallurgical plant.
- Tailings from the hydrometallurgical process will be stored in a TMF to be constructed within a historic open pit. Overflow water from the TMF will be stored in an adjacent historic open pit.

INFRASTRUCTURE – THOR LAKE

- The Thor Lake site is isolated and access will be limited to year-round aircraft, and summer barges. Winter ice roads on Great Slave Lake are also feasible, but are not included as an integral part of the PFS.
- A temporary barge dock and a materials storage area will be constructed on the shore of Great Slave Lake.
- A camp, offices, shops, yards, diesel tank farm, propane storage facility, and access roads to the TMF and the barge dock on Great Slave Lake will be developed.
- The initial site power will be provided by an 8.4 MW capacity diesel generating station. The diesel plant design is based upon having two spare units at any given time.

INFRASTRUCTURE – PINE POINT

- The Pine Point site is accessible by all-weather roads and highways.
- A temporary barge dock and yard at the shore of Great Slave Lake will be developed for the movement of concentrate and supplies.
- Offices, shops, yards, and access roads to the TMF and the temporary barge dock on Great Slave Lake will be developed.
- Power will be taken from the southern NWT power grid, with hydroelectricity taken from the Taltson Dam hydroelectric facility.

- The use of diesel generators to supplement the grid power is planned for times when hydroelectric power availability is limited at the expanded production rate.

ENVIRONMENT

- Baseline studies have been completed for the Project locations.
- Avalon has prepared and submitted a project description report, completed preliminary screening and commenced the Environmental Assessment process necessary for the permit application process in the NWT.
- Rock characterization studies indicate that the rock is not an acid producer.
- Nechalacho mineralization has uranium levels that are higher than average in naturally occurring granite, but below levels typically experienced in other rare earth deposits. The thorium levels in the Nechalacho deposit are anomalous, but given the lower radioactivity equivalency of thorium relative to uranium, the overall effect of typical Nechalacho mineralization as a rock mass is predicted to be very low. The rare earth concentration process planned at the Flotation Plant will concentrate the rare earths, including the low levels of thorium in the rock minerals. The overall radiation level in the concentrate is expected to be below Canadian TDGR regulations, and will not require special handling as Dangerous Goods.
- In RPA's opinion, environmental considerations are typical of underground mining and processing facilities and are being addressed in a manner that is reasonable and appropriate for the stage of the Project.

ECONOMICS

- RPA notes that the rare earths prices used in the UPFS, while on average more than double those used in the PFS, have been outstripped by current price movements, which have increased by an order of magnitude. The prices are based on independent, third-party forecasts for 2015, based on supply and demand projections from 2011 to 2015. In RPA's opinion, these long-term price forecasts are a reasonable basis for estimation of Mineral Reserves, and are considerably more conservative than prices used by other rare earths companies whose projects are at an earlier stage of development.
- Given the extent of the Nechalacho deposit Mineral Resources, a significantly higher production rate would be reasonable, absent any market constraints. RPA expects that significant improvements in Project economics could be realized in a higher production rate scenario.
- Income taxes and NWT mining royalties on the Project are dependent on the selected method of depreciation of capital, and may also be reduced by application of credits accumulated by Avalon. In RPA's opinion, there is potential to improve the after-tax economic results, as the Project is advanced.

26 RECOMMENDATIONS

RPA recommends that Avalon advance the Thor Lake Project to the Feasibility Study stage and continue the NWT permitting process. Specific recommendations by area are as follows.

GEOLOGY AND MINERAL RESOURCES

RPA makes the following recommendations:

- NMR values in the block model should be updated to use UPFS price inputs. Cut-off NMR value should be updated to equal UPFS operating cost. RPA expects that the effect would be to add lower-grade mineralization to the resource total.

MINING

RPA makes the following recommendations:

- Review of the stoping sequence and stoping plans to determine whether further increases in the feed grades in the early years are obtainable.
- Carry out additional paste fill design and testwork to determine the suitability of the tailings and to estimate the quantity of paste fill which can be generated from the tailings stream.
- Incorporate additional Indicated Resources into the mine plan as they become available.
- Investigate higher production rate scenarios.

PROCESSING – CONCENTRATOR

- Optimization of mass pull (affecting concentrate handling costs) vs. recovery (affecting revenue) for the concentrator should be carried out at the Feasibility stage.
- Perform a pilot plant demonstration of the flotation process.

PROCESSING – HYDROMETALLURGICAL PLANT

- Continue testwork to optimize the mineral cracking process, to fully define the process for the recovery of values from the flotation concentrate and run a pilot plant demonstration of the process.
- Conduct a trade-off study for site location of the hydrometallurgical plant.

INFRASTRUCTURE

- Review availability of grid power for both site locations as the Project is advanced.

ENVIRONMENT

- Continue the permitting process for the Project.

ECONOMICS

- Review the marketing considerations as they apply to the Project, with particular attention to the currently volatile rare earths prices

Avalon provided a budget (Table 26-1) for the completion of a Feasibility Study, environmental assessment and permitting, aboriginal engagement, metallurgical pilot tests and securing customer contracts as of July 2011. In the opinion of RPA, this budget is reasonable and appropriate for advancing the Project.

TABLE 26-1 PROJECT ADVANCEMENT BUDGET
Avalon Rare Metals Inc. – Thor Lake Project

Item	Cost (C\$ millions)
Exploration/Upgrade Drilling & Geology	10.0
Metallurgical Testwork	11.2
Technical Studies & Support	4.5
Environmental Work	0.8
Sales & Marketing	1.5
Administration	5.5
Total	33.5

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28 DATE AND SIGNATURE PAGE

This report titled "Technical Report on the Thor Lake Project, Northwest Territories, Canada" and dated August 22, 2011 was prepared by and signed by the following authors:

Signed & Sealed "*Jason J. Cox*"

Dated at Toronto, Ontario
August 22, 2011

Jason J. Cox, P.Eng.
Senior Mining Engineer
RPA

Signed & Sealed "*John R. Goode*"

Dated at Toronto, Ontario
August 22, 2011

John R. Goode, P.Eng.
Metallurgist
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Signed & Sealed "*Donald H. Hains*"

Dated at Toronto, Ontario
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Donald H. Hains, P.Geo.
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RPA

Signed & Sealed "*Tudorel Ciuculescu*"

Dated at Toronto, Ontario
August 22, 2011

Tudorel Ciuculescu, M.Sc., P.Geo.
Senior Consulting Geologist
RPA

29 CERTIFICATE OF QUALIFIED PERSON

JOHN R. GOODE

I, John R. Goode, P.Eng., as an author of this report entitled "Technical Report on the Thor Lake Project, Northwest Territories, Canada", prepared for Avalon Rare Metals Inc., and dated August 22, 2011, do hereby certify that:

1. I am a metallurgist with J.R. Goode and Associates of Suite 1010, 65 Spring Garden Avenue, Ontario, M2N 6H9.
2. I am a graduate of the Royal School of Mines, London University, UK, in 1963 with a Bachelor of Science (Chemical Engineering in Metallurgy) degree.
3. I am registered as a Professional Engineer in the Province of Ontario (Reg.# 16561011). I have worked as a Metallurgical Engineer for a total of 48 years since my graduation. My relevant experience for the purpose of the Technical Report is:
 - Worked in a plant that recovered rare earths and thorium as by-products of a Rio Algom uranium plant in the Elliot Lake mining camp
 - Researched, designed and commissioned a new rare earth recovery plant attached to the Denison uranium plant in the Elliot Lake camp
 - Performed several rare earth, niobium, and tantalum design and cost studies including those for Molycorp, Mountain Pass; Niocan, Oka Nb-Ta-rare earth project; and Pacific Metal tantalum-niobium plant, Guangdong, China
 - Completed several dozen due diligence, pre-feasibility, and feasibility, design, and commissioning projects involving metallurgy of gold, uranium, rare metals, and base metals around the world.
 - Vice-President, Mining and Metallurgy, Kilborn Ltd., an engineering company now part of SNC Lavalin.
4. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
5. I visited the Thor Lake property, Yellowknife, Hay River, and Pine Point on September 10 to 14, 2009.
6. I am responsible the preparation of Section 13 and parts of Section 17 of the Technical Report.
7. I am independent of the Issuer applying the test set out in Section 1.5 of NI 43-101.
8. I have had no prior involvement with the property that is the subject of the Technical Report.
9. I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.

10. To the best of my knowledge, information, and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 22nd day of August, 2011

(Signed & Sealed) “John R. Goode”

John R. Goode, P.Eng.

DONALD H. HAINS

I, Donald H. Hains, P.Geo., as an author of this report entitled "Technical Report on the Thor Lake Project, Northwest Territories, Canada" prepared for Avalon Rare Metals Inc. and dated August 22, 2011, do hereby certify that:

1. I am Associate Consultant, Industrial Minerals with Scott Wilson Roscoe Postle Associates Inc. of Suite 501, 55 University Ave Toronto, ON, M5J 2H7.
2. I am a graduate of Queen's University, Kingston, Ontario, in 1974 with an Hon. B.A. degree in chemistry. I am a graduate of Dalhousie University, Halifax, N.S. in 1976 with a Master of Business Administration specializing in finance and marketing
3. I am registered as a Professional Geoscientist in the Province of Ontario (Reg.# 0494). I have worked as a geoscientist for a total of thirty-one years since my graduation. My relevant experience for the purpose of the Technical Report is:
 - Analysis of rare earth production opportunities, 1986
 - Due diligence reports on selected Ta/Nb/rare earth deposits, 1988 – 2010 in Canada, Saudi Arabia, southern Africa, Brazil
 - Due diligence reports on selected carbonatite/rare earth deposits, 1996 – 2010 in Canada, Brazil, southern Africa
 - Due diligence reports on selected minerals sands deposits, including monazite and xenotime, 19995 – 2010 in Africa, United States and Australia
 - Various market studies of supply and demand and applications for Ta/Nb/zircon/rare earths, 1986 - 2010
 - Research scientist, Fiberglas Canada Ltd. and Domtar Construction Materials, 1979 – 1981 and 1989 - 1990
4. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI43-101.
5. I have not visited the Thor Lake Property.
6. I am responsible for preparation of Section 19 of the Technical Report.
7. I am independent of the Issuer applying the test set out in Section 1.5 of National Instrument 43-101.
8. I have had no prior involvement with the property that is the subject of the Technical Report.
9. I have read National Instrument 43-101, and the Technical Report has been prepared in compliance with National Instrument 43-101 and Form 43-101F1.

10. To the best of my knowledge, information, and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 22nd day of August, 2011

(Signed & Sealed) “Donald H. Hains”

Donald H. Hains, P.Ge

JASON J. COX

I, Jason J. Cox, P.Eng., as an author of this report entitled "Technical Report on the Thor Lake Project, Northwest Territories, Canada", prepared for Avalon Rare Metals Inc., and dated August 22, 2011, do hereby certify that:

1. I am a Senior Mining Engineer with Scott Wilson Roscoe Postle Associates Inc. of Suite 501, 55 University Ave Toronto, ON, M5J 2H7.
2. I am a graduate of the Queen's University, Kingston, Ontario, Canada, in 1996 with a Bachelor of Science degree in Mining Engineering.
3. I am registered as a Professional Engineer in the Province of Ontario (Reg.# 90487158). I have worked as a Mining Engineer for a total of 9 years since my graduation. My relevant experience for the purpose of the Technical Report is:
 - Review and report as a consultant on more than a dozen mining operations and projects around the world for due diligence and regulatory requirements
 - Feasibility Study project work on three North American mines
 - Planning Engineer to Senior Mine Engineer at three North American mines
 - Contract Co-ordinator for underground construction at an American mine
4. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
5. I visited the Thor Lake Property and Pine Point Property on September 10 to 14, 2009.
6. I am responsible for the overall preparation of the Technical Report.
7. I am independent of the Issuer applying the test set out in Section 1.5 of NI 43-101.
8. I have had no prior involvement with the property that is the subject of the Technical Report.
9. I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.
10. To the best of my knowledge, information, and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 22nd day of August, 2011

(Signed & Sealed) "Jason J. Cox"

Jason J. Cox, P.Eng.

TUDOREL CIUCULESCU

I, Tudorel Ciuculescu, M.Sc., P.Geo., as an author of this report entitled "Technical Report on the Thor Lake Project, Northwest Territories, Canada", prepared for Avalon Rare Metals Inc., and dated August 22, 2011, do hereby certify that:

1. I am Senior Geologist with Roscoe Postle Associates Inc. of Suite 501, 55 University Ave Toronto, ON, M5J 2H7.
2. I am a graduate of University of Bucharest with a B.Sc. degree in Geology in 2000 and University of Toronto with an M.Sc. degree in Geology in 2003.
3. I am registered as a Professional Geologist in the Province of Ontario (Reg.# 1882). I have worked as a geologist for a total of 6 years since my graduation. My relevant experience for the purpose of the Technical Report is:
 - Preparation of Mineral Resource estimates.
 - Over 5 years of exploration experience in Canada and Chile.
4. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
5. I visited the Thor Lake Project on November 22, 2010 and April 25 to 27 2011.
6. I am responsible for overall preparation of Sections 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 23 and contributed to Sections 1, 25 and 26 of the Technical Report.
7. I am independent of the Issuer applying the test set out in Section 1.5 of NI 43-101.
8. I have had no prior involvement with the property that is the subject of the Technical Report.
9. I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.
10. To the best of my knowledge, information, and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 22nd day of August, 2011

(Signed & Sealed) "Tudorel Ciuculescu"

Tudorel Ciuculescu, M.Sc., P.Geo.